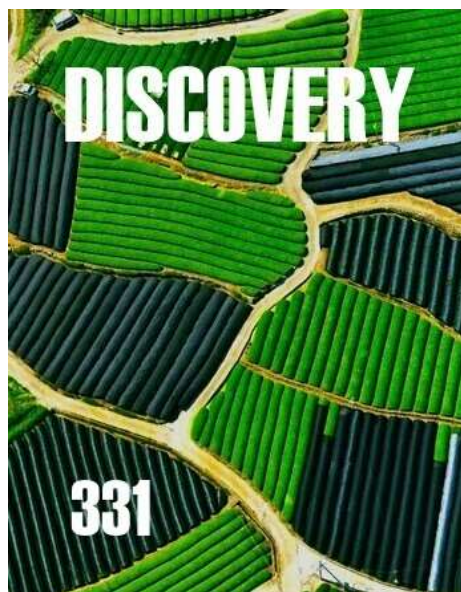


DISCOVERY

About the Cover



ReviTec is an innovative technology of soil restoration established in Cameroon in 2012 by the Bremen-based Partnership Cooperation. The experiment was conducted to evaluate the effectiveness of this technology to restore *hardés* soils in northern Cameroon. Two monitoring periods were scheduled (2015 and 2016) inside and outside of ReviTec. Some parameters of soil (pH, texture, moisture, soil compaction) and vegetation (herbaceous percentage coverage and tree growth (bio volume)) were evaluated inside and outside of ReviTec. Results indicated that substrate filled in ReviTec biodegradable bags (compost, biochar, mycorrhiza, silt, etc.) influences soil pH and texture positively. pH and texture respectively remain acidic and silty loam outside of ReviTec (on *hardé*) whereas inside of the ReviTec site, pH became alkaline and texture changed into sandy clay loam. During the both monitoring periods, the percentage of soft soils (ss) and semi-soft soils (sss) were always significantly higher in ReviTec site than outside respectively 44.44% ss, 42.60% sss, 12.96% hs inside of ReviTec site and 2.08% ss, 19.80% sss and 78.12% hs outside of ReviTec in 2015 and 53.70% ss, 31.50% sss, 14.81% hs inside ReviTec site and 5.20% ss, 20.83% sss, 73.96% hs outside of ReviTec in 2016. Percentage coverage of herbaceous species was higher inside ReviTec site (almost 100% near structures) than outside during each monitoring period and bio volume of trees was almost the same, inside (1,2m³) and outside (1,4m³) in 2015 whereas in 2016 it has considerably increased inside ReviTec (1,2m³ to 2,8m³) compared to outside (1,4m³ to 1,9m³) (Ref: Jourmbi MZ, Toumba D, Danmori I, Paggo BOR, Gové A. Assessment of the efficiency of ReviTec technology for soil restoration in sudano-sahelian part of northern Cameroun: Case of Hardé soils of Maroua-Salak. Discovery 2023; 59: e84d1274).

Assessment of the efficiency of ReviTec technology for soil restoration in sudano-sahelian part of northern Cameroun: Case of *Hardé* soils of Maroua-Salak

Michaël Zirted Jourmbi, Daniel Toumba, Idrissou Danmori, Bruno Olivier Rouama Paggo, Arafat Gové

ReviTec is an innovative technology of soil restoration established in Cameroon in 2012 by the Bremen-based Partnership Cooperation. The experiment was conducted to evaluate the effectiveness of this technology to restore *hardés* soils in northern Cameroon. Two monitoring periods were scheduled (2015 and 2016) inside and outside of ReviTec. Some parameters of soil (pH, texture, moisture, soil compaction) and vegetation (herbaceous percentage coverage and tree growth (bio volume)) were evaluated inside and outside of ReviTec. Results indicated that substrate filled in ReviTec biodegradable bags (compost, biochar, mycorrhiza, silt, etc.) influences soil pH and texture positively. pH and texture respectively remain acidic and silty loam outside of ReviTec (on *hardé*) whereas inside of the ReviTec site, pH became alkaline and texture changed into sandy clay loam. During the both monitoring periods, the percentage of soft soils (ss) and semi-soft soils (sss) were always significantly higher in ReviTec site than outside respectively 44.44% ss, 42.60% sss, 12.96% hs inside of ReviTec site and 2.08% ss, 19.80% sss and 78.12% hs outside of ReviTec in 2015 and 53.70% ss, 31.50% sss, 14.81% hs inside ReviTec site and 5.20% ss, 20.83% sss, 73.96% hs outside of ReviTec in 2016. Percentage coverage of herbaceous species was higher inside ReviTec site (almost 100% near structures) than outside during each monitoring period and bio volume of trees was almost the same, inside (1,2m³) and outside (1,4m³) in 2015 whereas in 2016 it has considerably increased inside ReviTec (1,2m³ to 2,8m³) compared to outside (1,4m³ to 1,9m³).

Discovery, 2023, 59, e84d1274

Mean displacement law for black body radiations and temperature of electromagnetic waves

Ganesa Moorthy C, Udhaya Sankar G

Wien's displacement law was derived from mode value of the very old Planck's distribution for black body radiations. One more new displacement law is derived from mean value of the Planck's distribution, by evaluating two integrals. They are used to propose definitions for temperature of electromagnetic waves.

Discovery, 2023, 59, e85d1279

Evaluation of environmental impact of e-waste dumpsite on heavy metal composition of selected vegetables

Odoh CC, Chukwuma EC, Ajiwe VIE

Electronic waste (e-waste) has emerged as a global environmental challenge because of its massive production volume, insufficient management policy in many countries and associated health risk. This study evaluated the environmental impact of e-waste dumpsite, considering the heavy metals assimilation through the soil to contaminate vegetables. Samples of 3 different types of edible vegetables (cucumber, water melon and garden egg leaves) were collected from a site located very close to the e-waste dumpsite in three locations (namely: Ochanja, Venn Road and Obosi town). The vegetables were analyzed to ascertain the heavy metal concentration on the raw vegetables in order to determine the bio-concentration or accumulation of the metals. Pb, Ba and Fe concentration was exceeded in water melon and garden leave only, Cr and Al exceeded the maximum limit in all the vegetables, while Ag, Cu and Cd were below the permissible limit. The concentration of most metals exceeded the maximum limit recommended by WHO and FAO (2010); this indicates excessive contamination and health risk associated with consuming vegetables from the e-dumpsites locations. It is suggested that suitable remediation measures should be adopted in the region.

Discovery, 2023, 59, e86d1280

Effects of dietary supplementation of *Prosopis africana* (African mesquite) essential oil on the growth performance, nutrient retention and oxidative stress indices of broiler chicken

Alagbe JO, Agubosi OCP, Oluwafemi RA

This research was undertaken to evaluate the effects of dietary supplementation of *Prosopis africana* essential oil on the growth performance, nutrient retention and oxidative stress indices of broiler chickens. A total of 540 one-day-old (Arbo acre) broiler chicks were randomly assigned to six treatment groups with six replicates of fifteen birds each. Experimental diet was adequate in all nutrients according to NRC, (1994) recommendation. Dietary treatments were as follows: Treatment 1 (T1): Basal diet with no *Prosopis africana* oil (PAOs); T2: Basal diet plus neomycin at 2.5 g/kg while T3, T4, T5 and T6 were fed basal diet supplemented with 200 mg, 400 mg, 600 mg and 800 mg/kg PAOs respectively. Improvements for body weight gain and feed conversion ratio ($P < 0.05$) were observed in birds fed PAOs compared to the other treatments. Mortality rate was highest in T1 (5.33 %) followed by T2 (3.02 %) and T3 (1.00 %) ($P < 0.05$). Dressing percentage and weights of organs were significantly ($P < 0.05$) influenced by the treatments except the weights of kidney, spleen, pancreas and busra ($P > 0.05$). Dry matter and crude protein digestibility were highest in T3 through T6, intermediate in T2 and lowest in T1 ($P < 0.05$). Malondialdehyde, catalase, glutathione peroxidase, reduced glutathione and superoxide dismutase were significantly ($P < 0.05$) different among the treatments. *Conclusion*: It was concluded that the dietary supplementation of PAOs up to 800 mg/kg in broiler chickens could arouse its appetite translating to higher weight gain, increased secretion of enzymes in the gastro intestinal tract as well as reduction of free radicals.

Discovery, 2023, 59, e87d1283

Reactions of the 2,5-pyridine dicarboxylic acid (dicarpy)-bridged iron (III) dimer, [Fe((saloph))₂-μ-dicarpy], with β-mercaptoacetic acid and β-mercaptoethylamine in aqueous perchloric acid

Pius O Ukoha, Clara O Anidobu, Uchechukwu R Obeta, Uchechukwu S Oruma

Kinetics of the reduction of [(Fe(saloph))₂-μ-dicarpy] by β-mercaptoacetic acid and β-mercaptoethylamine was followed spectrophotometrically at 424 nm. The reactions were conducted at pseudo-first order conditions of a large excess (≥ 20-fold) of the reductants over the oxidant at 29°C and ionic strength of 0.001 mol dm⁻³ (NaClO₄). Under these conditions, *k*_{obs} increased with concentration of reductants and pseudo-first order plots were linear for at least 85% extent of reaction. Second order rate constants were fairly constant at 0.112 ± 0.007 dm³mol⁻¹S⁻¹ (β-mercaptoacetic acid) and 0.59 ± 0.016 dm³mol⁻¹S⁻¹ (β-mercaptoethylamine) indicating first order dependence of rate on concentration of the reductant. Plots of log *k*_{obs} versus Log[reductant] gave slopes close to unity for both reactions, implying first order dependence of rate on concentration of the reductants respectively. Within the acid concentration 1 × 10⁻⁴ ≤ [H⁺] ≤ 80 × 10⁻⁴ mol dm⁻³ rates of the reactions decreased as acid concentration increased. This has been interpreted in terms of possible protonation or deprotonation of the redox partners before the electron transfer step. Both reactions showed positive primary salt effect, indicating involvement of like charges at the rate determining step. There was insignificant retardation of the reactions on addition of catalytic amounts of CH₃COO⁻, Cl⁻ and NO₃⁻. This is indicative of likely operation of parallel inner and outer-sphere paths for the reactions. The reactions have been rationalized on the basis of parallel inner-sphere and outer-sphere paths mediated by protonated reductants and oxidant species at low pH for β-mercaptoethylamine reaction and dissociated β-mercaptoacetic acid molecule for the [(Fe(saloph))₂-μ-dicarpy]-mercaptoacetic acid reaction.

Discovery, 2023, 59, e88d1284

Response of wheat to different application doses of Diammonium Phosphate

Muhammad Subhan, Muhammad Mujahid Akbar, Mumtaz Hussain, Dilawar Hussain, Sumaira Gull, Nabeel Arshad, Mohsin Iqbal, Shakeel Ahmad, Muhammad Feroz, Noor Ud Din

This study aimed to investigate the impact of various dosages of diammonium phosphate (DAP) on the growth and production of wheat crops. The experiment was conducted using a randomized complete block design with three replications at MNS University of Agriculture, Multan. Four treatments were applied, including a control group (T1) and three different dosages of DAP (T2: 50 kg/acre, T3: 35 kg/acre and T4: 20 kg/acre). Various growth parameters, including plant population, plant height, number of tillers, number of grains per spike, 1000 grain weight, yield per kanal and estimated yield per acre, were measured and analyzed. The results showed that the application of DAP had significant effects on the measured parameters. Treatment T2, with the recommended dosage of 50 kg/acre of DAP, exhibited the highest plant population, tallest plants, highest number of tillers, highest number of grains per spike, heaviest 1000 grain weight and the highest yield per kanal and estimated yield per acre. Conversely, the control group (T1) had the lowest values for all parameters. These findings suggest that the application of DAP, particularly at the recommended dosage of 50 kg/acre, positively influenced the growth and production of wheat crops. Farmers and agricultural practitioners can utilize this information to optimize fertilizer application strategies for improved wheat cultivation. Further studies can explore additional factors and optimize dosages to maximize crop productivity while considering environmental sustainability.

Discovery, 2023, 59, e89d1293

Africa informal technology sector borrowing principles, concepts, theories, techniques and methods from other sectors

Wangai Mambo

Informal sector artisans require actionable guidance that is provided by theories and techniques whose strengths and weakness are known, yet the informal sector faces resource scarcity which makes it nearly impossible to develop its theories and techniques. Theories and methods are based on concepts and principles. The African informal sector compared with other informal sectors in the world has fewer explicit theories and methods for building its knowledge and methods bases. A low-cost way for informal sector to have theories and methods is to borrow them and their components from similar domains. African informal technology developing sector is one of grassroots innovation movements around the globe. The study used a design science and literature review, analysis and synthesis and extension research method and codified process for borrowing theories from other fields through this study.

Discovery, 2023, 59, e90d1285

Effect of canal sediments and farmyard on Wheat (*Triticum aestivum* L.) yield and yield components at El Multaga Area, Northern State (Sudan)

Ali Abdalla Mohammed, Imran Ali Ahmed, Amar Wedaa Hamad, Hbiballa Abdelhafiz

Study was conducted for two successive winter seasons; 2020/21 and 2021/22, at the Research Farm of the National Institute of Desert Studies (RFNIDS), New Hamdab Scheme, Northern State of Sudan. The objective was to study the effect of treatments interactions of canal sediments (20 and 40 ton ha⁻¹), application of farmyard manure fertilizer (0 and 10 ton ha⁻¹) on wheat (*Triticum aestivum* L.) growth and yield in the area. The experimental design was a complete randomized block design (RCBD) with four replicates. The results showed that there were no significant differences (*P* ≤ 0.05) on number of plants per meter square in both seasons. There were significant differences (*P* ≤ 0.01) on plant height, number of tillers, number of seeds/spike, thousand seed weight, grain yield and harvest index in both seasons and highly significant differences (*P* ≤ 0.01) according to the interactions effect

of these factors on biological yield (Kg ha⁻¹) and straw yield in both seasons. The combination of application of (40 ton ha⁻¹) canal sediment and (10 ton ha⁻¹) farmyard manure showed the greatest averages of yield and yield components of wheat (*Triticum aestivum* L.) in both seasons at El-Multaga soil series -Northern State of Sudan.

Discovery, 2023, 59, e91d1288

ENGINEERING

Reliability analysis of mobile air compressor component of air hose

Ukpaka CP, Orukwowu Umejuru, Nkoi B

The air hose failure as a component of Mobile Air Compressor (MAC) was monitored in the operation of Obrikom gas plant for a period of four years and downtime, mean time between failure, failure rate, reliability, unreliability and availability values were evaluated in this investigation. The air hose as a component in the mobile air compressor plays a major role in the day- to – day operation of gas plant facility. The downtime increases from 68hrs to 79hrs for period of four years sampling with 68hrs for first year sampling, 72hrs for second year sampling, 75hrs for third year and 79hrs for fourth year sampling. The mean time between failures was evaluated for each of sampling period and the following results were obtained as 496hrs, 397.7hrs, 324hrs and 235.2hrs for the period of four years sampling and the failure rate values were 0.000684, 0.000799, 0.000913 and 0.00114. The investigation demonstrates decrease in the mean time between failure and increase in the failure rate as well as the reliability of air hose mobile air compressor decreases with increase in sampling time of the year as the cost of unreliability increases as the year of sampling increases. This investigation addresses the usefulness of air hose component in mobile air compressor and the need for continuous monitoring for the purpose of preventive maintenance as well as increase production.

Discovery, 2023, 59, e92d1290

MEDICINE

Accuracy of lateral scapular slide test and modified lateral scapular slide test in smartphone users with scapular dyskinesia: A cross-sectional study

Apoorva Andhare, Neha Gotmare

Background: Lateral Scapular Slide test (LSST) and Modified Lateral Scapular Slide test (MLSST) are used to evaluate scapular dyskinesia. *Aims:* To find out the accuracy of the LSST and MLSST in Smartphone users with Scapular Dyskinesia. *Method:* 75 individuals aged 18-35 years were screened with Smartphone use of more than 4 hours daily. LSST was performed with arm at the side, 45° abduction and at 90° abduction with medial rotation. The first two positions in MLSST were performed similarly as in LSST, while the third position was performed with 90° scaption and 1kg load. A difference of bilateral measurement between the inferior scapular angle and the T7 vertebral spinous process was obtained. *Result:* MLSST was found to be more accurate test (70%) than LSST (60%) to assess scapular dyskinesia. *Conclusion:* Applying loads in scaption position in the MLSST improved the accuracy of the test to diagnose scapular dyskinesia and may substitute the third position in the conventional LSST.

Discovery, 2023, 59, e93d1275

SOCIAL SCIENCE

Twenty-first-Century effective principles for successful urban Christian missions in Nigeria

Akinyemi Oluwafemi Alawode, Rev Ishaya Adamu Jangado

The twenty-first Century Church faces many challenges in doing urban Christian missions, such as a need for a strategic plan to carry out effective Christian missions in Nigerian cities. Over the years, Christian missions emphasised village missions and underdeveloped places. However, recently there has been a clarion call to shift attention to urban missions. Massive Christian mission opportunities are more evident in the cities than rural areas because the cities attract more people than rural communities. People from different religious backgrounds are all present in the cities, the rich and the poor, the givers and the beggars, sane and insane, the hurts and the unhurt people, hard-working and lazy people, busy people and the less busy, diplomats and businessmen and women, travellers and passers-by and host of others. This article researches the concepts of urban missions, discusses the significance of urban missions and challenges of urban missions and draws out practical principles of doing urban missions in the twenty-first Century.

Discovery, 2023, 59, e94d1277