

PAKISTAN JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Patron

Dr. Anwarul Haq

S.I., Pride of Performance,

Tamgha-e-Baqa, FPAS, FTWAS

Chairman, PCSIR

Dr. Rabia Zuberi

Chief Editor

Dr. Khurshid Zaman

Executive Editor

Editorial Board

Dr. H. Akhtar

*Agriculture and Agri-Food Canada, Ontario,
Canada*

Prof. M. Akhtar, FRS

*University of Southampton, Southampton,
United Kingdom*

Dr. A. G. Attkins

University of Reading, Reading, United Kingdom

Prof. G. Bouet

University of Angers, Angers, France

Dr. M. A. Khan

*King Abdulaziz City for Science & Technology,
Riyadh, Kingdom of Saudi Arabia*

Prof. W. Linert

*Vienna University of Technology, Vienna,
Austria*

Prof. B. Hiralal Mehta

University of Mumbai, Mumbai, India

Prof. E. Miraldi

University of Siena, Siena, Italy

Dr. S. Narine

University of Alberta, Edmonton, Canada

Dr. J. R. Ogren

*Editor, Journal of Materials Engineering and
Performance, Los Angeles, USA*

Prof. H. M. Ortner

*Technical University of Darmstadt, Darmstadt,
Germany*

Dr. M. J. Qureshi

*Nuclear Institute for Food & Agriculture, Peshawar,
Pakistan*

Dr. Zafar Saeed Saify

Karachi, Pakistan

Dr. F. M. Slater

Cardiff University, Powys, United Kingdom

Prof. M. A. Waqar

*Sindh Institute of Urology & Transplantation (SIUT),
Karachi, Pakistan*

Dr. S. I. Zafar

PCSIR Laboratories Complex, Lahore, Pakistan

Editors

Ghulam Qadir Shaikh

Shagufta Y. Iqbal

Riazuddin Qureshi

Gulzar Hussain

Shahida Begum

Editorial Address

Pakistan Journal of Scientific and Industrial Research

PCSIR Scientific Information Centre

PCSIR Laboratories Campus, Karachi - 75280, Pakistan

Tel: 92 - 021 - 8151739 - 40, 8151741 - 43; Fax: 92 - 021 - 8151738; E - mail: pcsirsys@super.net.pk; pcsir-sic@cyber.net.pk

ACKNOWLEDGEMENT

i

PHYSICAL SCIENCES

Levels of total petroleum hydrocarbons (TPH) and heavy metals in shrimp waste meal supplemented broiler feeds and droppings

A.A.Adeniyi, O.O.Oduguwa, O.C.Asunumeh, Y.O.Ikekhuwa and A.O.Fabiyi (Nigeria)

1

Production of biogas at mesophilic and thermophilic temperatures

I.Ali, M.Mohsin Ali, M.A.Basit and A.R.Khan (Pakistan)

5

A family of iteration formulas for the determination of the zeros of a polynomial

S.E.Uwamusi (Nigeria)

9

The effect of fresh and aged Cassava processing effluent on the physio - chemical properties of soil

J.E.Ebhoaye and J.O.Dada (Nigeria)

13

Geochemical and flotation studies of copper ore of North Waziristan Agency

M.Riaz, V.Hussain, K.Faridullah, Mumtaz, N.Jan and K.Khan (Pakistan)

17

Synthesis and characterization of silyl - group - containing fluorenes

S.A.Khan and M.Faisal (Pakistan)

21

BIOLOGICAL SCIENCES

Biochemical changes in chickpea roots after inoculation with virulent and hypovirulent. Isolates of *Fusarium oxysporum* f. sp. *ciceris*

I.A.Khan, S.S.Alam and A.Jabbar (Pakistan)

25

Antibacterial activity of Pakistani *Rhazya stricta*

S.Ahmad, K.Fatima and Atiq-ur-Rahman (Pakistan)

29

Recycling of sugarcane industrial waste as a biofertilizer through composting

M.A.Arain and F.Qamar (Pakistan)

34

Trace elements in indigenous medicinal diuretic plants in human health and disease (*Cymbopogon citratus* (DC) Stapf., *Raphanus sativus* Linn. and *Zea mays* Linn.)

M.Mirza, Z.Yaqeen, A.Bano, R.B.Qadri and M.Qadiruddin (Pakistan)

42

Seed - borne Mycoflora of oats in the Punjab

A.H.Tariq, S.Ahmad, M.A.Hussain, L.H.Akhtar, M.Arshad and S.Z.Siddiqui (Pakistan)

46

Effects of nitrogen and copper fertilization on rice yield and fertilizer nitrogen efficiency: A ¹⁵N Tracer Study

A.T.M.A Choudhury and Y.M.Khanif (Australia)

50

Integrated pest management of potato cutworm, <i>Agrotis ipsilon</i> (Hufnagel) <i>M.A.Mannan, M.A.Hossain, M.R.Ali and R.Tasmin (Bangladesh)</i>	56
---	----

A study of the oil content of Nigerian grown <i>Monodora myristica</i> seeds for its nutritional and industrial applications <i>I.A.Ajayi, K.O.Adebowale, F.O.Dawodu and R.A.Oderinde (Nigeria)</i>	60
---	----

SHORT COMMUNICATION

Physico - chemical characteristics of commonly consumed legumes after domestic processing <i>Zia-ur-Rehman, A.M.Salariya and S.Samreen (Pakistan)</i>	66
---	----

Allelopathic effect of aqueous extracts of <i>Calotropis procera</i> on germination and seedling growth of maize <i>J.Kayode (Nigeria)</i>	69
--	----

<i>In vitro</i> assessment of the probiotic properties of <i>Lactobacillus acidophilus</i> from faeces and fresh cow milk <i>V.O.Oyetayo, F.C.Adetuyi and F.A.Akinyosoye (Nigeria)</i>	73
--	----

REVIEW

Toxicity of dyes and dye intermediates <i>S.Waheed and G.R.Khan (Pakistan)</i>	76
--	----

AIMS & SCOPE

Pakistan Journal of Scientific and Industrial Research is a bimonthly Journal aims to publish research articles, current reviews and short communications from varied key scientific disciplines. It covers all relevant topics of fundamental, technical and applied aspects of significant industrial importance. Each bimonthly issue is reviewed by the eminent International experts and contributions are acquired from scientists and industrially related academics and researchers.

The scope of the Journal is broad and provides widest coverage in the fields of Technology, Organic Chemistry, Inorganic Chemistry, Physical Chemistry including Natural Products and Synthesis, Biology, Agriculture, Physics, Mathematics and Geology.

Subscription Rates

Organization/Institution	Local:	Foreign
Per Volume	Rs. 2000/-	US\$ 400/-
Per Issue	350/-	70/-
Academic		
Per Volume	Rs. 1800/-	US\$ 350/-
Per Issue	325/-	60/-
Personal		
Per Volume	Rs. 1500/-	US\$ 325/-
Per Issue	300/-	50/-

Electronic format

Electronic format of this journal is available with: *Bell & Howell Information and Learning, 300 North Zeeb Road, P.O. 1346, Ann Arbor, Michigan 48106, U.S.A;*
Fax No.: 313 - 677 - 0108; <http://www.umi.com>.

Photocopies

Photocopies of back issues can be obtained through submission of complete reference to the Executive Editor against the payment of Rs. 25.00 per page per copy (Registered) and Rs. 115 per copy by courier service within Pakistan. Rest of the World, US\$ 10.00 per page per copy (US\$25.00 per page per copy by courier service).

Copyrights

Copyrights of this Journal are reserved however, limited permission is granted to researchers for making references, and libraries/agencies for abstracting and indexing purposes according to international practice.

Published by

Scientific Information Centre, PCSIR Laboratories Campus, Karachi - 75280, Pakistan.

Printed by

Printed by Saad Publications, Karachi, Pakistan.

ACKNOWLEDGEMENT

Scientific Information Centre, Pakistan Council of Scientific and Industrial Research, Karachi, Pakistan extend utmost gratitude to the following eminent Scientists/Subject experts for their thorough review and valuable feedback for the articles appearing in January - February 2004 issue of Pakistan Journal of Scientific and Industrial Research.

EXECUTIVE EDITOR

Ahmad, N.	Pakistan
Akhtar, L. H.	Pakistan
Akhtar, M.	Pakistan
Alam, S. M.	Pakistan
Ali, M.	Pakistan
Baig, S.	Pakistan
Choi, S. W.	Korea
Cotta, M. A.	USA
Elwakil, M. A.	Egypt
Fahimuddin	Pakistan
Ghaffar, A.	Pakistan
Haq, M. Z.	Bangladesh
Hashem, M. A.	Pakistan
Iqbal, M. Z.	Pakistan
Iqbal, S. H.	Pakistan
Iqbal, Z.	Pakistan
Kamal, R.	Canada
Khair-un-nisa	Pakistan
Mahmood, T.	Pakistan
Malik, A.	Pakistan
Naeem, R. K.	Pakistan
Nasreen, Z.	Pakistan
Neumann, S.	UK
Pervez, M. A.	Pakistan
Quddus, M. A.	Pakistan
Qureshi, G. A.	Pakistan
Rahman, Atta-ur	Pakistan
Saeed, M.	Pakistan
Saffarini, G.	Jorden
Solankee, A. N.	Pakistan
Upadhyay, R. K.	India
Yalcin, H.	Turkey

LEVELS OF TOTAL PETROLEUM HYDROCARBONS (TPH) AND HEAVY METALS IN SHRIMP WASTE MEAL SUPPLEMENTED BROILER FEEDS AND DROPPINGS

A A Adeniyi^{*a}, O O Oduguwa^b, O C Asunumeh^b, Y O Ikekhua^b and A O Fabiyi^b

^a*Department of Chemical Sciences, Lagos State University, Ojo, P.M.B. 1087, Apapa, Lagos, Nigeria*

^b*Department of Animal Nutrition, University of Agriculture, P.M.B. 2240, Abeokuta, Nigeria*

(Received August 1, 2002; accepted February 4, 2003)

The study determined the levels of cadmium, lead and total petroleum hydrocarbons (TPH) in shrimp waste meal supplemented feeds and droppings of the broiler birds. The samples were collected randomly over a period of two months. Cadmium and lead were determined by atomic absorption spectrophotometry, while total petroleum hydrocarbons (TPH) were determined gravimetrically by following standard methods. The results show for cadmium $0.61 \pm 0.48 \mu\text{g/g}$ and $0.81 \pm 0.32 \mu\text{g/g}$, respectively; $9.49 \pm 2.24 \mu\text{g/g}$ and $11.49 \pm 1.55 \mu\text{g/g}$ for lead; $369.00 \pm 108.40 \mu\text{g/g}$ and $330.20 \pm 59.03 \mu\text{g/g}$ for TPH, respectively for the starter and finisher feeds. The statistical analysis of variance reveal significant differences at 95% confidence level for lead and TPH compared with control samples. The droppings of the broilers were also collected and analysed with statistically significant difference existing for lead.

Keywords: Shrimp waste meal, Total petroleum hydrocarbons (TPH), Cadmium, Lead, Contamination.

PRODUCTION OF BIOGAS AT MESOPHILIC AND THERMOPHILIC TEMPERATURES

Ismat Ali^a, M Mohsin Ali ^a, M A Basit ^a and A Rasheed Khan^b*

^aFuel Research Centre PCSIR, Karachi - 75280, Pakistan

^bH. No. R - 157, Abid Town, Gulshan-e-Iqbal 1 -2, Karachi, Pakistan

(Received February 28, 2002; accepted July 10, 2003)

Experiments were accomplished for the production of biogas using a slurry comprising 50% fresh buffalo dung and 50% water at ambient and elevated temperatures. After 2 weeks, observations for the release of biogas were noted. It was observed that with the increase of temperature, the rate of generation of gas was enhanced. A slurry containing 200 g fresh buffalo dung and 200 g water produced 121.5 ml gas / day at an average ambient temperature of 35°C, whereas at 45°C, 50°C, 55°C and 60°C, the average rates of gas generation were noted as 152.0, 221.5, 292.0 and 354.0 ml / day. The volume of 232.5 ml of biogas in excess was produced with the temperature difference of 25°C (60°C - 35°C). The input of 42000 joules of energy for heating 400 ml of slurry produced gas of 5196.375 joules. It shows that there is a loss of 36803.625 joules of heat which makes the process, thermally, not viable. Hence, ambient temperature is recommended for the production of biogas for domestic plants.

Keywords: Buyffalo dung, Fermentaion, Biogas, Thermophilic temperatures.

A FAMILY OF ITERATION FORMULAS FOR THE DETERMINATION OF THE ZEROS OF A POLYNOMIAL

Stephen Ehidiamhen Uwamusi

Department of Mathematics, Faculty of Science, University of Benin, Edo State, Nigeria

(Received August 8, 2002; accepted July 31, 2003)

We present a class of globally monotonically convergent iterative methods for the determination of zeros of a polynomial. The proposed method uses the well-known Newton's second order method as a basic ingredient to generate this class of methods, following the approach of Petkovic and Trickovic as supported by Cauchy Schwartz inequality from which come in hand three methods of fourth order. The obtained methods can be used to provide tight inclusion conditioning bounds separating the sought zeros. This means that they always provide good numerical approximations within the theoretical conditioning bounds. It is found that one of the fourth order methods so obtained competes most favourably with any known methods for finding zeros of a polynomial.

Key words: Newton's methods, Halley's methods, Chebyshev's method, Polynomial zeros.

THE EFFECT OF FRESH AND AGED CASSAVA PROCESSING EFFLUENT ON THE PHYSIO - CHEMICAL PROPERTIES OF SOIL

J E Ebhoaye and J O Dada*

Department of Chemistry, Ambrose Alli University, Ekpoma, Nigeria

(Received November 27, 2002; accepted August 21, 2003)

Fresh *Cassava* processing effluent was obtained from a *Cassava* processing mill in Ekpoma, Edo State. One half of the fresh effluent was used to pollute top soil while the second half was aged for 7 days before use. The relative effects of the fresh and aged *Cassava* effluents on the physio - chemical properties of soil were determined. The effects of pollution varied with the soil/effluent contact period and the nature of the effluent. The result showed increase in the levels of pH, organic carbon, phosphorus, sodium, potassium; and decrease in calcium, magnesium and nitrogen in the soil after treatment with the effluents. There were no marked differences in the particle size distribution nature of the soil and the level of the exchangeable acidity after treatment with the effluents. The results showed that the disposal on the top soil of fresh and aged *Cassava* processing effluent could have diverse effects on the nutrient availability in the soil.

Key words: *Cassava*, particle size, Dicotyledon plant, *Euphorbiaceae*.

GEOCHEMICAL AND FLOTATION STUDIES OF COPPER ORE OF NORTH WAZIRSTAN AGENCY

M Riaz^a, V Hussain^{b*}, K Faridullah^a, Mumtaz^a, N Jan^a, K Khan^a

^{a)} PCSIR Laboratories, Jamrud Road, Peshawar, Pakistan

^{b)} Department of Geology, University of Karachi, Karachi 75270, Pakistan

(Received May 9, 2002; accepted August 23, 2003)

Important copper deposits of North Wazirstan Agency are confined to Shinkai and Degan Paikhel areas Miran Shah Town. The copper mineralization in these areas is of native and sulphide types as veins, veinlets, stringers and rims around fragments and associated with cupriferous breccia. The cupriferous massive sulphides occur in basalts belonging to obducted ophiolite complex. An average copper contents of 17 ore samples is 0.45%. The flotation results show that maximum liberation of chalcopyrite with gangue minerals occurs at - 63 (240 mesh) size. The complex nature of valuable minerals with gangue does not hinder the separation of copper from the gangue materials. Results show that the copper contents of the ore were enhanced from 0.5% to 24.0% in the concentrate. For ensuring better results about grade and recoveries, further studies on second and third stage flotation are needed.

Key words: Copper mineralization, Sulphide, Ophiolite complex, Froth flotation.

SYNTHESIS AND CHARACTERIZATION OF SILYL - GROUP - CONTAINING FLUORENES

Shah Alam Khan* and Mahtab Faisal

PCSIR Laboratories Complex, Jamrud Road, Peshawar - 25120, Pakistan

(Received November 11, 2000; accepted January 6, 2004)

Cyclization reactions of biphenyl with dichloropropyltrichlorosilane and dichlorobutyltrichlorosilane in the presence of anhydrous aluminum chloride catalyst gave 9 - (2 - trichlorosilylethyl)fluorene and 9 - methyl - 9 - (2 - trichlorosilylethyl) fluorene along with isomeric uncyclized products. All the compounds were structurally identified by GC / MS, ^1H and ^{13}C - NMR spectroscopy.

Key words: Cyclization of biphenyl, Friedel - Crafts alkylation, Chlorosilyl - ethyl fluorenes.

Biological Sciences

Pak. J. Sci. Ind. Res. 2004 **47**(1) 25 - 28

BIOCHEMICAL CHANGES IN CHICKPEA ROOTS AFTER INOCULATION WITH VIRULENT AND HYPOVIRULENT. ISOLATES OF *FUSARIUM OXYSPOURUM* F. SP. *CICERIS*

Iftikhar A Khan^a, S Sarwar Alam^{a*} and Abdul Jabbar^b

^aNuclear Institute for Agriculture and Biology, P O Box 128, Jhang Road, Faisalabad, Pakistan

^bDepartment of Chemistry, Islamia University, Bahawalpur, Pakistan

(Received April 30, 2002; accepted September 5, 2002)

ANTIBACTERIAL ACTIVITY OF PAKISTANI *RHAZYA STRICTA*

Shahnaz Ahmad*, Kaneez Fatima and Atiq-ur-Rahman

Pharmaceutical Research Centre, PCSIR Laboratories Complex, Off University Road, Karachi - 75280, Pakistan

(Received December 6, 2001; accepted June 23, 2003)

The crude ethanolic extract of *Rhazya stricta* Dcne; (Family, Apocynaceae) was tested, on the basis of medicinal and folklore reports for antimicrobial activity against a wide range of gram - positive and gram - negative organisms. Leaves extract was found to be more active as compared to other parts exhibiting 69.23% and 66.66% activity against gram - positive and gram - negative organisms respectively. Seeds extract exhibited maximum inhibitory activity ("A" category zone) i.e. 23.07% and 16.66% against gram - positive and gram - negative organisms respectively as compared to other parts of *Rhazya stricta*. Reference standard i.e. co-trimoxazole exhibited only 7.69% "A" category zones against gram - positive organisms only.

Key words: *Rhazya stricta*, Apocynaceae, Antibacterial activity.

RECYCLING OF SUGARCANE INDUSTRIAL WASTE AS A BIOFERTILIZER THROUGH COMPOSTING

Muhammad Anwar Arain^a and Fatima Qamar^{*b}

^a Southernzone Agricultural Research Center, PARC, Karachi University Campus, Karachi - 75270, Pakistan

^b FMRRRC, PCSIR Laboratories Complex, Off University Road, Karachi - 75280, Pakistan

(Received June 24, 2002; accepted June 30, 2003)

About 500 tons of industrial wastes (liquid and solid) being discharged daily from sugar factory during crushing season and presently dumped in vicinity of the sugar factory. The quantity of wastes, however, depends on the crushing capacity of sugar mills. Studies for recycling and composting of sugarcane industrial waste press mud, boiler ash and distillery waste water, as a biofertilizer, was carried out at Habib Sugar Mills Ltd., Nawabshah, Sindh, Pakistan. Samples of waste were collected for analysis from dumping ground. By mixing the heaps of press mud and boiler ash, 3:1 ratio was formed. Each heap was sprinkled with distillery waste water for two months with regular interval of one day. Two manual turning of heaps were done to maintain the temperature during the curing period and thereafter allowed for 3 months for decomposition and humus formation. Based on physico-chemical analysis of finished product, it is estimated that each ton of biofertilizer contains value-added nutrient of Rs.2897/= when compared with chemical fertilizer other than the soil amendment characteristic. The cost effectiveness of the biofertilizer for millers and farmers were about Rs.1:4 and Rs.1:12, respectively.

Key words: Sugarcane industrial waste, Compost, Biofertilizer, Press mud, Boiler ash, Distillery waste water.

TRACE ELEMENTS IN INDIGENOUS MEDICINAL DIURETIC PLANTS IN HUMAN HEALTH AND DISEASE (*CYMBOPOGON CITRATUS* (DC) STAPF., *RAPHANUS SATIVUS* LINN. AND *ZEAMAYS* LINN.)

Maryam Mirza*, Zahra Yaqeen, Alia Bano, R B Qadri and Muhammad Qadiruddin

PCSIR Laboratories Complex, Karachi-75280, Pakistan

(Received March 15, 2003; accepted July 15, 2003)

Three indigenous medicinal plants reported to be diuretic have been selected for the study of trace elements and their possible role in human health. Twelve trace elements (Cu, Zn, Mn, Fe, Cu, Ni, Cd, Pb, Cr, Ag, Na and K) have been detected and estimated in ash of various parts (leaves of *Cymbopogon citratus* (DC) Stapf., seeds of *Raphanus sativus* Linn. and corn silk of *Zea mays* Linn.).

Key words: Diuretic medicinal plants, Trace elements, *Cymbopogon citratus*, *Raphanus sativus*, *Zea mays*.

SEED - BORNE MYCOFLORA OF OATS IN THE PUNJAB

Altaf Hussain Tariq, Saeed Ahmad, Muhammad Arshad Hussain, Lal Hussain Akhtar*, Muhammad Arshad and Sabir Zameer Siddiqui

Regional Agricultural Research Institute, Bahawalpur, Pakistan

(Received May 10, 2003; accepted September 30, 2003)

Twenty - eight seed samples of eight oats (*Avena sativa* L.) cultivars were collected from Sargodha, Faisalabad and Bahawalpur districts of the Punjab, Pakistan during 1999 - 2000 and analyzed for seed - borne mycoflora during 2000 - 2001. Four genera and nine species of fungi were identified at different frequencies. *Drechslera avenae* and *D. sorokiniana*, known pathogens causing pre - and post - emergence seedling blight and leaf spot in mature plants were detected in 67.80 and 53.60% of the seed samples with maximum infection of 34.00 and 6.00%, respectively. *Phoma* sp. was found in 46.40% of the sample with a maximum infection of 16.00%. *Phoma* is a new pathogen recorded on oats in Pakistan. All these fungi were found equally pathogenic and caused 86.00, 67.80 and 86.70% pre - and post - emergence seedling mortality in pathogenicity test. These pathogens produced almost the same type of symptoms on roots and leaves. In two samples *Cephalosporium* sp. was recorded in high frequencies (up to 66.00%) but did not show any pathogenic effect on seeds and seedlings. The observed association of different fungi with oats seeds in the present study indicates the need of thorough survey for these and other pathogenic fungi.

Key words: *Avena sativa*, Seed - borne fungi, Seed germination.

EFFECTS OF NITROGEN AND COPPER FERTILIZATION ON RICE YIELD AND FERTILIZER NITROGEN EFFICIENCY: A ^{15}N TRACER STUDY

A T M A Choudhury* and Y M Khanif

SUNFix Centre for Nitrogen Fixation, Faculty of Agriculture, Food and Natural Resources, Ross Street Building A03, The University of Sydney, NSW 2006, Australia

(Received May 11, 2002; accepted November 7, 2003)

A greenhouse experiment was conducted at University Putra Malaysia to evaluate the effects of nitrogen (N) and copper (Cu) fertilizations on rice yield and fertilizer N efficiency using ^{15}N tracer technique. Four rates of N (0, 60, 120 and 180 kg N ha⁻¹) and three rates of Cu (0, 5 and 10 kg Cu ha⁻¹) were used in this study. Nitrogen was applied as ^{15}N tracer technique. Four rates of N (0, 60, 120 and 180 kg N ha⁻¹) and three rates of Cu (0, 5 and 10 kg Cu ha⁻¹) were used in this study. Nitrogen was applied as ^{15}N labelled urea. Grain yield increased significantly due to N fertilization up to 120 kg N ha⁻¹. Regression analysis indicated that grain yield response due to N fertilization that was quadratic in nature. Estimated N rate for maximum yield was 158 kg N ha⁻¹. Copper application did not increase grain yield although the soil was deficient in Cu. The ^{15}N atom excess percentage in both grain and straw, and fertilizer N uptake by rice plant increased gradually with increasing N rates. Recovery (%) of fertilizer N was around 40% irrespective of N and Cu rates. The non-significant effect of Cu might be due to higher Cu adsorption in the soil. Plant analysis results indicated that Cu content in the straw was below the critical deficiency level of 6 mg kg⁻¹. These findings indicate that higher rate of Cu fertilizer (above 10 kg Cu ha⁻¹) may be useful in this soil to increase rice yield and fertilizer N efficiency if Cu is applied as basal. Alternately, Cu may be applied as foliar spray on standing crop to avoid Cu adsorption in the soil. Further, research is needed to find out the optimum Cu rate and method of application for this soil.

Key words: Nitrogen, Copper, Rice, ^{15}N Tracer technique.

INTEGRATED PEST MANAGEMENT OF POTATO CUTWORM, *AGROTIS IPSILON* (HUFNAGEL)

M A Mannan ^{b*}, M A Hossain ^b, M R Ali ^a and R Tasmin ^a

^aDepartment of Zoology, A.M.College, Mymensingh, Bangladesh

^bRegional Agricultural Research Station, Jamalpur, Bangladesh

(Received September 28, 2001; accepted January 2, 2004)

An experiment was conducted at Regional Agricultural Research Station (RARS), Jamalpur, Bangladesh, during the period from November 2000 to March 2001 to find out the effective management strategy in controlling potato cutworm, *Agrotis ipsilon* in the field. The integration of different cultural, biological and chemical management practices showed significant effect on cutworm infestation than the control plots. The lowest percentage of infested tuber by number and weight was observed from the plots treated with hand picking + two irrigation + one spray of Dursban + perching and its yield was also highest. It might be considered as an integrated pest management (IPM) package for combating the cutworm on potato.

Key words: IPM, Potato cutworm, *Agrotis ipsilon*

A STUDY OF THE OIL CONTENT OF NIGERIAN GROWN *MONODORA MYRISTICA* SEEDS FOR ITS NUTRITIONAL AND INDUSTRIAL APPLICATIONS

I A Ajayi, K O Adebowale, F O Dawodu and R A Oderinde*

Chemistry Department, University of Ibadan, Ibadan, Nigeria

(Received June 2, 2001; accepted January 6, 2004)

A study of the oil content of *Monodora myristica* for its potential and industrial applications has been undertaken. The study revealed that *M. myristica* seeds have high oil and protein content ($21.79 \pm 0.51\%$ and $20.57 \pm 0.38\%$, respectively). The carbohydrate content is quite high, ($44.29 \pm 1.50\%$) while it has low crude fibre content ($4.70 \pm 0.15\%$). The physico - chemical characteristics of the seed oil show that the oil has high acid value, ($14.31 \pm 0.32\%$); peroxide value, ($15.90 \pm 0.50\%$) and saponification value, ($252.11 \pm 2.50\%$). The iodine value of the seed oil which places the oil in the non-drying group is $85.00 \pm 0.50\%$. Eight nutritionally valuable minerals of the seeds were determined and the result indicates the seeds to be richest in potassium 64.96 ± 1.60 ppm followed by magnesium (8.58 ± 1.50 ppm) and iron (8.40 ± 0.91 ppm). Fatty acid composition of the seed oil shows the oil to be rich in linoleic acid (35.52%) and oleic acid (33.15%). It also contains arachidic acid 9.52% . The other fatty acids present in the oil are palmitic acid, stearic acid, gadoleic acid and linoceric acid. Triacylglycerols (OOO, OPO / POO and OOL) accounted for over 57.70% of the total triacylglycerol content of the oil. In addition, high molecular weight triacylglycerols (containing fatty acid moiety > 18 carbons) was also detected in oil. The potential domestic and industrial applications of the oil under study are enumerated.

Key words: *Monodora myristica*, Physico - chemical properties, Mineral element, Fatty acid.

PHYSICO - CHEMICAL CHARACTERISTICS OF COMMONLY CONSUMED LEGUMES AFTER DOMESTIC PROCESSING

Zia-ur-Rehman*, A M Salariya and S Samreen

Biotechnology and Food Research Centre, PCSIR Laboratories Complex, Lahore-54600, Pakistan

(Received October 5, 2001; accepted March 25, 2003)

Food legumes, widely grown and consumed throughout the world are excellent sources of proteins (20 - 25%) and carbohydrates (50 - 60%). They are also fairly good sources of dietary fibre, minerals and vitamins. However, presence of tannins, phytic acid and other anti-nutritional substances reduce the availability of protein and other nutrients in legumes (Morrow 1991; Van der Poel *et al* 1991; Stanley 1992). Most of the nutrients and anti-nutrients are lost during soaking and cooking processes (De-Leon *et al* 1992). Physical characteristics of certain legumes are associated with these soaking and cooking processes (Phirke *et al* 1982; Attia *et al* 1994). However, digestibility of starch and protein of the legumes is not well documented in literature. This paper reports the effect of cooking on nutrients, anti-nutrients and digestibility of protein and starch of commonly used legumes. Physical characteristics of these legumes were also studied after soaking them in simple water.

ALLELOPATHIC EFFECT OF AQUEOUS EXTRACTS OF *CALOTROPIS PROCERA* ON GERMINATION AND SEEDLING GROWTH OF MAIZE

J Kayode

Department of Plant Science and Forestry, University of Ado - Ekiti, Ado - Ekiti, Nigeria

(Received January 14, 2002; accepted November 12, 2003)

The effects of 24 and 48 h leaf extracts of *Calotropis procera* on radicle and plumule growth of four cultivars of maize (Oba Super I, II, III and IV) were examined. Both extracts demonstrated considerable inhibitory effects on the growth of radicle and plumule of the cultivars and the severity of the inhibition was observed to increase with the increase in the duration of the extraction.

The growth of Oba Super 1 tends to be the least inhibited while the growth of Oba Super III appeared to be mostly inhibited by the extracts when the growth and development of their radicle and plumule were compared to those of the control.

IN VITRO ASSESSMENT OF THE PROBIOTIC PROPERTIES OF *LACTOBACILLUS ACIDOPHILUS* FROM FAECES AND FRESH COW MILK

V O Oyetayo*, F C Adetuyi and F A Akinyosoye

Department of Microbiology, Federal University of Technology, P M B 704, Akure, Ondo State, Nigeria

(Received August 1, 2002; accepted November 14, 2003)

Probiotics are viable bacteria used as feed additives, which produce beneficial effects that bring about a balance of the intestinal flora. Strains of *Lactobacillus*, *Pediococcus*, *Bacteriodes*, *Bifido bacterium*, *Bacillus*, *Streptococcus* and *Escherichia coli* have been used as probiotics (Fuller 1986).

Lactobacilli are found in the normal intestinal flora of chickens and other animals from the first few days of their life (Fuller 1986). Their ability to inhibit both Gram- positive and Gram-negative bacteria had been reported (Klaenhammer 1988; DeVuyst and Vandemme 1994; Jin *et al* 1996). Chang and his co-workers (Chang *et al* 2001) recently reported that *Lactobacillus reuteri* BSA131 sourced from pig faeces strongly inhibited pathogenic bacteria used as indicator organism. Moreover, the adhesion of *Lactobacilli* to the epithelial wall of the small intestine of some animals had also been reported (Sarraf *et al* 1992; Jin *et al* 1996).

Review Article

Pak. J. Sci. Ind. Res. 2004 **47**(1) 76 - 90

TOXICITY OF DYES AND DYE INTERMEDIATES

*Shahina Waheed and Ghulam Rabbani Khan**

Applied Chemistry Research Centre, PCSIR Laboratories Complex Lahore, Pakistan.

(Received September 18, 2002; accepted March 19, 2003)

Dyes and pigments are mostly colored substances used for coloration. The chemicals used for their synthesis are hazardous for human life. The metabolism occurs primarily in liver and the metabolites formed are transported in the blood where they can form protein adduct or undergo renal filtration in urinary bladder lumens where at acidic pH, they can react covalently with DNA and the carcinogen DNA adducts formed cause disorders in the whole metabolic reactions. Many carcinogenic/ mutagenic hazards, which occur in the body, have been summarized for public awareness.

Key words: Toxicity of dyes, Coloration, Dye intermediates, Pigments.

INSTRUCTIONS TO AUTHORS

Pakistan Journal of Scientific and Industrial Research publishes original research in all scientific and technological fields in the form of **research articles**, **short communications** and critical **reviews**. All manuscripts are evaluated by subject experts. However, authenticity of the contents will be the sole responsibility of the authors.

The papers should be submitted with a covering letter signed by all the authors, with their names, addresses and highest qualifications, indicating the corresponding author and certifying that the paper has neither been, nor will be sent elsewhere for publication. Names and addresses of four experts of the relevant field including two foreign referees should also be provided. In case a paper is withdrawn after registration, the author/s will be billed for service charges.

Three legible double spaced typed copies of the manuscript are to be submitted containing, in order, **Running Title** (not more than 60 characters), **Title** of the article, full names, addresses, telephone numbers, fax numbers, e-mail addresses of all the **Authors**, **Abstract** (not more than 150 words), three or more **Key Words**, **Introduction**, **Materials and Methods**, **Results and Discussion**, **Illustrations** and **References**.

All **illustrations** including figures, drawings and photographs should be of good quality, suitably labelled, captioned, numbered and referred to in the text alongwith **tables** and **references**. The **drawings** should be in black ink, on art or tracing paper, drawn to fit in single or double columns (8 or 16.5 cm) on reduction. Letterings and symbols should be of sufficient size so as to be clearly legible on reduction. Use IUPAC rules for **units** and their **abbreviations**.

Three sets of **original coloured or black & white photographs(s)**, mounted on light weight white card board, should be provided. In case of coloured photographs(s), 50% printing expenses would have to be borne by the author(s).

References should be cited in **the text** by the last name of the author (both authors if only two, the first author and *et al* when more than two) followed by the year, in chronological order.

All **references** in the bibliography should be listed in alphabetical order of the authors' last names followed by date of publication and other complete details as given in the examples.

EXAMPLES

Journal Articles

In Bibliography:

- Reid R W, Watson J A 1995 Reaction of lodgepole pine to attack by blue stain fungi. *Can J Bot* **45** (2 Part 1) 45-50.
- Weenen H, Nkunya M H H, Bray D H, Mwasumbi L B, Kinabo L S, Kilimali V A E B 1990 Antimalarial activity of Tanzanian plants. *Plant Medic* **56**(4) 368-370.

Solheim H 1992a The early stages of fungal invasion in Norway spruce. *Can J Bot* **70** (4 Ser A) 112-119.

Solheim H 1992b Fungal succession in sapwood. *Eur J Pathol* **22** 143-158.

In Text:

(Reid and Watson 1995)

(Solheim 1992a)

(Solheim 1992a & b)

(Weenen *et al* 1990; Solheim 1992a; Reid and Watson 1995)

Chapters of Books

Demarchi DA, Marsh RD, Harcombe AP, Lea EC 1990 The environment. In: *The Birds of British Columbia*, eds Cambell R W & McNall M C E. Royal British Columbia Museum, Victoria, B C USA, Vol 2, 2nd ed, pp 366-425.

Books

Bennet O C, Myers J E 1974 *Momentum, Heat and Mass Transfer*. McGraw Hill, New York, USA, pp 540-562.

Thesis

Hu C 1989 A comparative study of peanut peroxidase isozyme. Ph.D thesis, Department of Plant Sciences, University of Western Ontario, London, Ontario, Canada.

Papers of Conferences/Symposia/Seminars

Jhonson S R, Knapp A K 1994 The role of *fire in Spartina pectinator* dominated tallgrass prairie wetlands. In: *Proceedings on 19th Tall Timbers Fire Ecology Conference*, Tallahassee, FL, USA, November 3-6, 1993.

Technical Reports

Tiller FM, Leu WF 1984 *Solid Liquid Separation for Liquefied Coal Industries*. Final Report for RP - 1411-1. EPRI, AP-3599, Electric Power Research Institute, Palo Alto, CA, USA.

Patents

Verschuur E 1978 *Agglomerating Coal Slurry Particles*. US Patent 4126426.

Two hard copies of the revised paper should be sent along with an electronic copy in Page Maker 6, 6.5, MS Word, Excel, IBM compatible. Responsibility for any error/omission in the paper lies with the author.

The **manuscripts** should be addressed to:

Executive Editor, Pakistan Journal of Scientific and Industrial Research, Scientific Information Centre, PCSIR Laboratories Campus, Karachi-75280, Pakistan.

Phone: (92-021)8151739, 8151740, 8151741-3

Fax: (92-021)-8151738,

E-mail: pcsirsys@super.net.pk and pcsir-sic@cyber.net.pk