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Some Common Fixed Point Theorems in Fuzzy 2-Metric Spaces

Sushil Sharma*[a] and Jayesh Kumar Tiwari[b]

[a]Department of Mathematics, Madhav Science College, Vikram University, Ujjain-456 010, Madhya Pradesh, India

[b]Department of Mathematics, Shri Vaishnav Institute of Management, Indore-452 001, Madhya Pradesh, India

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Abstract. The aim of this study was to prove some common fixed point theorems in fuzzy 2-metric spaces by removing the assumption of continuity, relaxing the compatibility or compatibility of type (α) or compatibility of type (β) to weak compatibility, and replacing the completeness of the space with a set of alternative conditions.

Keywords: fuzzy metric spaces, coincidence point, common fixed point, compatible maps, weakly compatible maps

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The Fe-Gd Phase Diagram

S. Atiq*[a], R. D. Rawlings[b] and D. R. F. West[b]
[a]PCSIR Laboratories, PO Box 387, Quetta, Pakistan
[b]Department of Materials, Imperial College, London, UK

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Abstract. The results of an experimental investigation of the iron-rich portion of the Fe-Gd system have confirmed previous studies showing that four incongruently melting intermetallic compounds exist, namely, $Fe_{17}Gd_2$, $Fe_{23}Gd_6$, Fe_3Gd and Fe_2Gd. The investigation also provided information about the crystal structures and ranges of stoichiometry of these intermetallic compounds.

Keywords: Fe-Gd phase diagram, Fe-Gd alloys, intermetallic compounds

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Effect of Sodium Chloride on Dissolution of Galena in Aqueous Acid Solution

Abdul Khalique*, Adnan Akram, A. S. Ahmed and Nusrat Hamid
Materials Science Research Centre, PCSIR Laboratories Complex, Lahore-54600, Pakistan

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Abstract. This paper presents the results obtained on the kinetic study of non-oxidative dissolution of natural galena in aqueous hydrochloric acid with the addition of sodium chloride. A chemical reaction on the surface of galena controlled the dissolution rates under the experimental conditions of investigation. The galena dissolution rate was of the first order with respect to hydrochloric ion activity in hydrochloric acid solution. The addition of sodium chloride to the acid solution greatly enhanced the dissolution rate. The effect of sodium chloride has two possible interpretations: firstly, it may be the result of an increase in the hydrogen ion activity; secondly, the enhancement of the dissolution rate, observable at the high sodium chloride concentration, may be due to the specific absorption of chloride ions or the surface complexing of chloride ions on galena surface.

Keywords: dissolution mechanism, kinetics of galena, effect of sodium chloride, non-oxidative dissolution, galena dissolution rate

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Separation of Close Boiling Acidic Isomers by Dissociation Extraction

A. S. Ahmed*, M. B. Bhatty, M. T. Saeed and M. P. I. Qazi
Glass and Ceramics Research Centre, PCSIR Laboratories Complex, Lahore-54600, Pakistan

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Abstract. The separation of *m*-cresol and *p*-cresol was studied using dissociation extraction technique. The separation factors obtained for cresols-carbon tetrachloride-caustic soda system were in the range of 1.40 to 1.52, whereas for cresols-carbon tetrachloride-monoethanolamine system were in the range of 1.297 to 1.417. Isomer ratios, concentration of cresols and the strength of aqueous extractant have a significant influence on the separation of cresols. The organic acid (*m*-cresol) was successfully back-extracted from aqueous caustic soda with a non-polar organic solvent, octanol. pH of the aqueous phase and the choice of organic solvent have an important role in the back-extraction of *m*-cresol.

Keywords: dissociation extraction, cresols, monoethanolamine, isomer separation, close-boiling isomers

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Determination of the Level of PCBs in Small Fishes from Three Different Coastal Areas of Karachi, Pakistan

A. B. Munshi, A. S. Hina* and T. H. Usmani
Centre for Environmental Studies, PCSIR Laboratories Complex, Karachi-75280, Pakistan

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Abstract. The level of congener polychlorinated biphenyls (PCBs) was determined in small fishes. These fishes were collected from the beaches of Korangi Creek, Hawksbay and Clifton, all located in Karachi, Pakistan. The contamination status of PCBs was followed by their concentration in tissues. Higher PCBs were found to be the most persistent organopllutants, present in all the fishes studied.The samples were spiked with 5µl surrogate internal standard solution containing IUPAC numbers 194 and 198. A total of 14 PCBs were screened in each sample. The concentrations of PCBs found were 1.25 ± 0.02 ng/g dry weight of fishes collected from Clifton, 1.01 ± 0.52 ng/g of fishes collected from Hawksbay, and 1.00 ± 0.43 ng/g of fishes collected from Korangi Creek. The congener PCBs 138,153, and in some small fishes 118, were found to be predominant among all the PCBs tested in this study.

Keywords: organic pollutants, PCBs, small fishes, Karachi coast, polychlorinated biphenyls

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Laboratory Evaluation of Plant Extracts as Antifeedant Against the Lesser Mealworm, *Alphitobius diaperinus* and Rice Weevil, *Sitophilus oryzae*

M. Kamruzzaman[a], M. Shahjahan*[b] and M. L. R. Mollah[a]

[a]Bangladesh Institute of Nuclear Agriculture, P O Box 4, Mymensingh-2200, Bangladesh

[b]Department of Entomology, Bangladesh Agricultural University, Mymensingh, Bangladesh

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Abstract. Studies were conducted on leaf, seed and bark extracts (acetone, ethanol and water) of *Ipomoea fistulosa, Datura fastuosa, Eucalyptus citridora, Helitropium indicum, Hedyotis corymbosa* and *Sapium indicum* for their antifeedant effects against the lesser mealworm, *Alphitobius diaperinus* and rice weevil, *Sitophilus oryzae*. The results showed that all the extracts of test plants had antifeedant effect on both the insects. Among the six plant extracts tested, *Sapium indicum* extracts had the highest antifeedant effect on the lesser mealworm and rice weevil. The ethanol extracts of leaf and seed were more effective than those obtained in the other two solvents. The coefficient of deterrency increased proportionally with increase in doses. The seed extract was more effective than leaf extract.

Keywords: plant extracts, antifeedant, lesser mealworm, rice weevil, *Alphitobius diaperinus, Sitophilus oryzae*

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Quantification of Bactericidal Action of the Ethanolic Extract of *Garcinia kola* Seeds Alone, and in Combination with the Branded Antibiotic Septrin, on the Culture Isolates from Throat Irritation Patients by Bacterial Growth Kinetics

V. A. Ajibade*[a], I. G. Adanlawo[b], T. T. Akande[a]

[a]Science Technology Department, Federal Polytechnic, PMB 5351, Ado-Ekiti, Nigeria

[b]Biochemistry Department, University of Ado-Ekiti, PMB 5363, Ado-Ekiti, Nigeria

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Abstract. The relationship of growth rates of *Streptococcus pyogenes,* isolated from patients with protracted throat irritations and tonsillitis, with *Garcinia kola* extract and the branded antibiotic Septrin was investigated. A steady state was obtained shortly after the addition of Septrin, whereas a lag phase of about five generations elapsed for *G. kola*. The inhibitory effect of Septrin was about five times greater than the effect of *G. kola.* The inhibitory effect of *G. kola* was only bacteriostatic, whereas Septrin caused bacterial death if a certain threshold of concentration (1 mg) was passed, as evidenced by a decrease in the number of bacterial cells. Combination of Septrin and *G. kola* at concentrations where both acted merely bacteriostatically, led to effects considerably greater than would be expected from simple additivity. It is justifiable to conclude that the combination of *G. kola* extract and Septrin had a synergistic effect.

Keywords: *Garcinia kola*, antibiotic Septrin, bacterial growth kinetics, ethanolic extract, antibiotic synergism, antibiotic Septrin, *Streptococcus pyogenes*, throat irritation

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Assessment of the Safety of Wild Strains of *Lactobacillus* as Probiotics Orogastrically Administered to Rats

V. O. Oyetayo

Department of Microbiology, Federal University of Technology, PMB 704, Akure, Nigeria

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Abstract. The safety of four wild strains of *Lactobacillus,* isolated from fresh cow milk and faeces of albino rat (*Rattus norvegicus*) was studied. Some biochemical parameters of the serum in the orogastrically-dosed rats were used as the index. A reduction in the levels of serum cholesterol and of serum aminotranferases in the rats orogastrically-dosed with *Lactobacillus* isolates, as compared with the control group was noted. There was no significant difference ($P > 0.05$) in the alkaline phosphatase levels of the control and the orogastrically-dosed rat groups. Serum globulin and bilirubin levels showed a significant difference ($P < 0.05$) among the control and the *Lactobacillus*-dosed groups. The control group recorded the highest weight gain among all the groups studied, but it was not significantly different ($P > 0.05$) from other treatments except in the rats dosed with the *Lactabacillus casei* strain isolated from cow milk. The rats dosed with *Lactobacillus* displayed beneficial effects as probiotics in terms of reduced serum cholesterol and liver function improvement in terms of reduction in the serum aminotransferase levels.

Keywords: *Lactobacillus* isolates, serum cholesterol, albino rats, cow milk, probiotics, *Lactobacillus* safety

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Restriction to Root and Shoot Growth Limits Their Growth Rates and Changes the Morphology of Cotton Seedlings During Emergence

Ghulam Nabi *[a] and C. E. Mullins[b]

[a]Land Resources Research Programme, National Agricultural Research Centre, Islamabad-45500, Pakistan

[b]Department of Plant and Soil Science, Cruickshank Building, University of Aberdeen, AB24 3UU, UK

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Abstract. Pre-germinated cotton seedlings were grown under laboratory conditions to determine the affect of root and/or shoot impedance on their growth. The treatments studied were: (i) both shoot and root unimpeded, (ii) shoot impeded and root unimpeded, (iii) root impeded and shoot unimpeded, and (iv) both root and shoot impeded. Impeding the root alone, or root and shoot together, significantly ($P < 0.05$) reduced axial root length, total root length, and increased root diameter. The axial root length was reduced by 55%. The number of root laterals was not affected by impedance but lateral spacing was reduced significantly. Root diameter was increased in treatments where only roots had been impeded. Shoot diameter was significantly ($P < 0.05$) greater in the root and shoot impeded treatments. Shoot length was reduced by 15% when only the shoots were impeded, while 38% reduction was noted when both root and shoot were impeded. Shoot impedance did not cause any significant effect on the root growth rate when roots were unimpeded. In terms of shoot length, root impedance had no effect on shoot length, although the combined effect of root and shoot impedance was greater than shoot impedance alone.

Keywords: mechanical impedance, root/shoot length, root/shoot diameter, restricted root elongation, root development

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Evaluation of Nutritive Properties of the Large African Cricket (*Gryllidae* sp)

Yemisi A. Adebowale[a], Kayode O. Adebowale*[b] and Michael O. Oguntokun[c]

[a]Department of Food Science and Technology, Federal University of Technology, Akure, Nigeria
[b]Department of Chemistry, University of Ibadan, Ibadan, Nigeria
[c]Department of Animal Production and Health, Federal University of Technology, Akure, Nigeria

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Abstract. The large African cricket (*Gryllidae* sp) was subjected to standard analytical procedures to determine its proximate composition, functional properties, amino acids spectrum, *in vitro* protein digestibility, and nutritionally valuable minerals. The moisture was low (2.13-3.48%), while the protein content was high (65.95%) in the male cricket and 65.11% in the female cricket). Seventeen amino acids were detected. The essential amino acids contributed 46.1-47.8% of the total amino acid content. Results of the *in vitro* protein multienzyme digestibility indicated high digestibility (90.7-94.7%). The amino acids scores were also favourable. The crude fibre and fat contents were fairly high, while the total carbohydrates were low (8.26-12.49%). The carbohydrates fraction contained 85.9-88.0% carbohydrates as stored glycogen. Phosphorus was the highest mineral in the ash (180.92 mg per 100 g), while the concentration of zinc was the lowest (1.46 mg per 100 g). Copper, manganese, nickel and lead were below the detection limits. Observations on the functional properties revealed low gelation, oil absorption, and emulsion capacity and stability. The effect of pH on the protein solubility showed that the lowest solubility occurred at the pH value of 4.0, while maximum solubility was recorded at the pH values of 6 and 7.

Keywords: *Gryllidae* sp, nutritional properties, functional properties, large African cricket, new protein source, *Gryllidae* amino acids

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Prevalence of Intestinal Helminth Parasites of Dogs in Lagos, Nigeria

Comfort Adejoke Ibidapo

[a]Department of Zoology, Lagos State University, Faculty of Science, PMB 1087, Apapa, Lagos, Nigeria

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Abstract. A survey of 310 dogs (164 males and 146 females) for infections with intestinal helminth parasites was carried out in Lagos, Southern Nigeria.Out of these, 175 were pet dogs and were routinely checked by veterinary doctors, while the remaining 135 were strayed-dogs, which did not receive medical check-up. Strayed-dogs were significantly more infected (77.8%) than the pet dogs (12.0%) at P < 01. The analysis of infection pattern, by age, revealed that among the strayed dogs, 92.2%, 76.6% and 59.5% of the puppies, young and adult dogs, respectively, were found infected. Corresponding prevalencies among the pet puppies, young and adult dogs were 21.5%, 7.1% and 5.0%. Helminth ova recovered from the strayed-dogs included *Toxocara canis* (47.6%), *Ancylostoma caninum* (41.9%), *Dipylidium caninum* (37.9%) and *Trichuris vulpis* (20.9%). Helminth ova recovered from the care-receiving dogs were *Toxocara canis* (5.8%), *Ancylostoma caninum* (3.2%) and *Dipylidium caninum* (2.1%). Female strayed-dogs, with a prevalence of 89.7%, were significantly more infected than their male counterparts (70.9%). Strayed-puppies, with an infection rate of 92.2%, were significantly more infected than strayed young and adult dogs. Public health implications of these results, with particular reference to zoonotic transmission, was highlighted.

Keywords: instestinal helminths, dog intestinal parasites, helminth ova, infected strayed-dogs, helminths of dogs

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Correlation and Path Analysis in Candidate Bread Wheat (*Triticum aestivum*) Lines Evaluated in Micro-Plot Test Trial

Tila Mohammad*, Sajjad Haidar, M. Jamil Qureshi, Abdul Jabbar Khan and Roshan Zamir
Nuclear Institute for Food and Agriculture (NIFA), Peshawar, Pakistan

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Abstract. Correlation and path analysis among yield and yield-associated traits of eight candidate bread wheat lines, including two check varieties, were studied during 2001-02. All the characters studied differed significantly from each other, except biological yield and harvest index. Positive genotypic and phenotypic correlation was estimated between plant height and biological yield. Plant height was negatively correlated with harvest index and grain yield, both at the genotypic and phenotypic levels. It was, however, non-significant at both levels. Significant and positive genotypic correlations were observed between biological yield with harvest index and grain yield. Path analysis showed that days to heading, days to maturity, and plant height had negative direct effect on grain yield, whereas biological yield and harvest index had a high and positive direct effect on grain yield. It may be concluded from the present studies that biological yield and harvest index may be considered as the best selection criteria in the selection of high yielding genotypes, at least from the standpoint of the evaluated set of genotypes.

Keywords: genotypic correlation , phenotypic correlation, bread wheat, path analysis, micro-plot trial, *Triticum aestivum*

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Isolation, Determination and Characterization of Taro (*Colocasia esculenta*) Starch

Feroz A. Jaffery[a], Abid Hasnain*[a], Khalid Jamil[b] and Tahir Abbas[b]
[a]Department of Food Science and Technology, University of Karachi, Karachi, Pakistan
[b]Food and Marine Resources Research Centre, PCSIR Laboratories Complex, Karachi, Pakistan

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Abstract. The starch content of taro (*Colocasia esculenta*) was determined using DNS colourimetric, acid-hydrolysis and enzymatic methods. Starch content varied from 80.3 to 81.3% as determined by DNS colourimetry. For the extraction of taro starch, different techniques were used. It was found that there was a noticeable improvement in the yield of starch using the freeze-thaw method. The various physicochemical properties of the extracted starch were also compared with the starch obtained by ammonia and alkali extractions. It was found that the hydration capacity, swelling volume, moisture absorption, freeze-thaw stability, as well as swelling power, were generally higher while solubility was lower of the freeze-thaw extracted starch than that extracted by ammonia and alkali. The DNS colourimetric method is recommended as a simple method for the determination of taro starch.

Keywords: taro starch, freeze-thaw extraction, starch extraction, DNS colourimetry, *Colocasia esculenta*, starch characterization