

Environmental Management

9403-001. Ahmed Sara (Inst Rural Manag, P.B. No. 60, Anand 388001, Gujarat). **The rhetoric of participation reexamined: the state, NGO's and water users at Varanasi, Uttar Pradesh, India.** *Environmentalist*, **14**(1) (1994), 3-16 [42 Ref].

Paper examines the rhetoric of participation in the implementation of the Ganga Action Plan (GAP) at Varanasi. Varanasi, however, is indicative of its failure to deliver this promise. Non-governmental organisations, traditionally viewed as intermediary actors between the micro and macro levels, work within the sociopolitical framework of the city. In the process, 'water-user groups such as the washermen who derive an economic livelihood from washing clothes in the Ganga, are literally excluded from the definition and process of participation.

9403-002. Ashutosh Subash, Chand Suresh, Pant NC, Sharma Rajesh (Trop Forest Res Inst, Jabalpur, MP). **Considerations of demand pattern and economic return on forest management and rationalisation of pricing of timber (teak).** *Indian Forester*, **120**(6) (1994), 483487 [2 Ref].

Air Pollution

9403-029. Ambulkar MN, Chutke NL, Aggarwal AL, Garg AN (Dept Chem, Nagpur Univ, Nagpur 440010). **Multi-elemental analysis of ambient air dust particulates from a cement factory by neutron activation.** *Sci Total Env*, **141** (1994), 93-101 [30 Ref]

Ambient air dust particulate samples collected from six different locations in the areas surrounding a cement factory in central India were analysed for 30 elements by instrumental neutron activation analysis. Wide differences have been observed in elemental concentrations of As, Br, Co, Cr, Fe, Se and Mn in dust particulates collected from different locations depending on its distance from the factory. A comparison of the data with mean elemental concentrations of fugitive dust collected from different locations of the same factory shows significant differences in Ba, Cr, Se, As, Mn and Br contents.

9403-030. Bahri UC, Jain CL, Maitin BK (Shriram Inst Indl Res, Analyt Sci Div, 19, Univ Rd, Delhi 110007). **Gas liquid chromatographic method for monitoring air borne toluene and cyclohexanone present as pollutants in environment.** *Indian J Environ Prot*, **13** (11) (1993), 801-803 [14 Ref].

A simple and precise gas liquid chromatographic method has been developed to monitor air borne toluene and cyclohexanone vapour in atmosphere around industries using these solvents in their manufacturing processes. The vapours are absorbed on to charcoal, desorbed with methanol and analysed. The proposed method involve 10% carbowax 20 M on chromsorb WHP 80/100 mesh stainless steel column and flame ionisation detector. The detection limits of the method are 1 ppm for toluene and 2 ppm for cyclohexanone and the working range is 1-50 ppm for toluene and 2-50 ppm of cyclohexanone.

9403-031. Banerjee BD, Singh AK, Kis-potta, J, Dhar BB (Centl Mining Res Stn, Barwa Rd, Dhanbad 826001). **Trend of methane emission to the atmosphere from Indian coal mining.** *Atmos Env* **28** (7) (1994), 1351-1352 [11 Ref].

The trend of coal production and the related methane emission to the atmosphere from the mining activities in India is presented. The estimates of emission have been found to increase from 0.06 million tonnes to 0.40 million tonnes between the year 1951 and 1991 and may further rise to 0.60 million by the turn of the century.

9403-032. Chattopadhyay Debabrata, Parikh Jyoti K (Indira Gandhi Inst Dev Res, Santosh Nagar, Gen, Arunkumar Vaidya Marg, Gorgaon (East), Bombay 400065). **CO₂ emission reduction from the power system in India.** *Natural Resources Forum*, **17** (4) (1993), 251-261 [12 Ref].

The power system in India accounts for nearly one-third of CO₂ emissions of the country as a whole. A comparison of some of the technical options to reduce CO₂emissions is presented in this paper. A linear programming framework is used to simulate the integrated optimal operation of the three regional grids, and it is shown that such operations lead to lower fuel costs and to lower CO₂ emissions reduction. Reduced fuel requirements also lead to reductions in other pollutants i.e. SO₂, NO and fly ash.

9403-033. Chutke NL, Ambulkar MN, Aggarwal, AL, Garg AN (Dept Chem, Nagpur Univ, Nagpur 440010). **Instrumental neutron activation analysis of ambient air dust particulates from metropolitan cities in India.** *Environ Polln*, **85** (1) (1994), 67-76 [44 Ref].

Ambient air dust samples were collected from industrial, commercial and residential areas of four metropolitan cities (Delhi, Calcutta, Madras and Cochin) in India, and were analysed for 27 elements. The results reveal that the concentration of several pollutant elements in dust samples from the four cities are highly variable. Wide differences were observed for elemental concentrations as As, Ba, Br, Cu, Cr, Hg, Fe, Sb, Se and Zn and these variations are explained in terms of their possible sources of origin.

9403-034. Devara PCS, Ernest Raj P, Sharma S (Indian Inst Trop Meteoro, Pune 411008). **Remote sensing of atmospheric aerosol in the nocturnal boundary layer using lidar.** *Environ Polln*, **85** (1) (1994), 97-102 [16 Ref].

Peper presents the results of the lidar experiments that have been performed during January 1989 through August 1990 to study the aerosol vertical distributions in the nocturnal atmosphere and their comparison with near-simultaneous aerological soundings for environmental monitoring; During the study period, the aerosol distributions showed significant stratified aerosol layer structures in the lower atmosphere throughout the south-west monsoon season (June-September), while these structures appear to be either erratic or absent during remaining months of the year. In addition, the aerosols present in the lowest air layers upto 200 m are found to contribute significantly (about 40%) to the aerosol loading in the nocturnal boundary layer at the lidar site.

9403-035. Gupta Daksha, Vidya Anup (Himachal Pradesh State Polln Contl Bd, Shimla), **Ambient air quality of Shimla town with reference to suspended particulate matter.** *Indian J Environ Hlth*, **36** (1) (1994), 40-42.

Burning of coal for heating the residential and office premises during winter and increased vehicular traffic during tourist season are the major activities which contribute to suspended particulate matter in the atmosphere. The particulate matter includes

particles from molecular size upto 500 micron in diameter. The particles between the size of 0.1 to 100 micron in diameter have tendency to remain in suspension in the air and is the major cause of concern.

9403-036. Katila FR (Environ Div, Netel Chromotographs, SV Rd, Manpada, Thane, Maharashtra). **Continuous air pollution monitors- a prerequisite to efficient control.** *Cheml Ind Digest*, **7** (1) (1994), 123-124.

At the stage of plant design, product quality monitoring methods, instrumentation and personnel are carefully thought of. At the time of designing of pollution control system for the same plant, the aspect of monitoring the quality of residual waste output is not given the attention it deserves, whereby the whole purpose of installing such a system is defeated. Such monitoring is essential for motivating installation and maintenance of pollution control equipment.

9403-037. Lal M, Cubasch U, Santer BD (Cent Atmospheric Sci, Indian Inst Techno, New Delhi 110016). **Effect of global warming on Indian monsoon simulated with a coupled ocean-atmosphere general circulation model.** *Curr Sci* **66** (6) (1994), 430-438 [28 Ref].

The impact of increasing greenhouse gas concentrations on the climate of Indian sub-continent and its variability is studied using the output from a time-dependent greenhouse warming simulation as well as a reference control experiment performed with the Hamburg global coupled atmosphere ocean circulation model. This model demonstrates substantial skill in simulating the present day climate and its inter-annual variability over the monsoon region.

9403-038. Murthy VM, Vittal Murty KPR (Andhra Univ, Dept Meteorol Oceanogr, Visakhapatnam 530003). **Remote sensing applications of environmental problems measure of CO₂-the role of terrestrial biota.** *Indian J Environ Prot*, **13** (11) (1993), 845-850 [17 Ref].

The vegetation index map is based on interpretation and analysis of NOAA-AVHRR sensor data of 1.1 km spatial resolution at nadir. This has been acquired at NRSA's ground station at Shadnagar near Hyderabad. The vegetation index map shows the spatial variability of vegetation condition. The various colours used to indicate the

increasing green leaf area and biomass. The normalised difference variation index varies from 0.05 to 0.4 in steps of 0.05.

9403-039. Niyogi Devdutta S, Patil RS (Dept Civil Engng, PREC at Loni (Univ Poona) 413736). **Metrose: a modified windrose for air quality management.** *Atmospheric Env* **28** (9) (1994), 1715 - 1717 [21 Ref].

A metrose is proposed for a pictorial representation of the meteorological parameters and is compared with the conventional windrose. In addition to the data represented by the windrose in relation to the wind speed and direction, the metrose includes the atmospheric stability persistence for each of the directions. The metrose is particularly more advantageous for applications in modelling and spatial planning and is more explicit than a windrose.

9403-040. Pandey J, Agrawal M (Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Diurnal and seasonal variations in air pollutant concentrations in a seasonally dry tropical urban environment.** *Curr Sci* **66** (4) (1994), 299-303 [21 Ref].

Air quality monitoring of Varanasi city indicates a logarithmic normal distribution pattern of 2-h mean concentrations of SO₂, NO₂, and O₃. Ozone concentrations peaked from late morning to afternoon of summer and those of SO₂ and NO₂ during early morning and late evening of winter months. The coincidence in the timing of SO₂ and NO₂ peaks appears interesting from the biological perspectives.

9403 041. Samantaray BKt Swar AK, Tiwari TN (Orissa State Polln Contl Bd Sector 5, Rourkela 769002). **Ambient air quality at the Barsuan Iron Ore Mines, Sundargarh.** *Indian J Environ Prot*, **13** (12) (1993), 899-902 [19 Ref].

A preliminary survey was conducted in February, 1992 to study the quality of ambient air at the Barsuan mines. Three sampling stations were selected for this purpose and 5 observations were made at each of these stations to determine the concentrations of 3 major air pollutants, namely suspended particulate matter, nitrogen dioxide, sulphur dioxide. Comparing these results with the national standards for ambient air quality, it concludes that there is no serious problem of air pollution in and around the Barsuan Iron Ore Mines, except for an occasional high concentration of suspended particulate matter.

9403-042. Saxena VP, Misra OP, Saxena Praveen M, Shrivastava A (Sch Mathematics Allied Sci, Jivaji Univ, Gwalior 474011). **A finite element approach to the problem of dispersion of CO from an area source with variable reaction rate.** *Asian J Exptl Sci*, **6** (1 & 2), (1992), 55-58 [8].

Paper studies the dispersion of CO from an area source in the atmosphere by considering the rate of reaction to be depending upon height. The model is formulated by using partial differential equation and is solved by variational Finite Element method. The atmosphere is divided into four layers depending upon the rate of reaction and the concentration of CO at different heights are estimated.

9403-043. Sharma VK, Patil RS (Indira Gandhi Inst Dev Res, Bombay 400065). **Chemical mass balance model for source apportionment of aerosols in Bombay.** *Environ Monit Assess* **29** (1) (1994), 75-88 [10 Ref].

Aerosol samples collected within an industrial region of Bombay were analysed for elemental concentrations using inductively coupled plasma emission spectroscopy, ultraviolet/visible spectrophotometry and X-ray fluorescence spectroscopy. Nineteen elements were selected as tracers of identified sources of aerosol in the region. It was found that U.S. EPA source profiles are not suitable for such regions in India and site specific source profiles should be used in the application of chemical mass balance for source apportionment.

9403-044. Singh Charanjit, Parwana HK, Singh RS, Marwaha SS (Punjab Polln Contl Bd, Patiala 147001). **Suspended particulate matter and SO₂ emissions from Guru Govind Singh Thermal Plant, Ropar (Punjab).** *Pollz Res* **13** (1) (1994), 79-81 [5 Ref].

Guru Gobind Singh Thermal Plant, Ropar (Pb.) is using about 13000 MT of coal per day. Such a huge coal burning per day has visible effects on human beings and plants. These factors lead to the investigations of suspended particulate matter (SPM) and SO₂ emissions going out and its effects on vegetation. Although electrostatic precipitators (ESPs) have been installed to control SPM but these are not adequate and the results are much above the defined limits. Moreover ESPs are not the devices for controlling SO₂ emissions. The physical survey of green belt around the thermal plant also shows the adverse effect of SO₂ emissions on the plants.

9403-045. Tiwari TN, Chaudhury Swati (Regl Engng Coll, Dept Phys, Rourkela 769008). **Concentration of suspended particulate matter in the ambient air at Rourkela.** *Indian J Environ Prot*, **13** (11) (1993), 821-824 [14 Ref].

Paper reports the results of a recent investigation to determine the concentration of suspended particulate matter (SPM) in the ambient air of Rourkela during the six month period January-June 1993. Three sampling stations were selected for this purpose. The concentration of SPM was determined at each of these 3 stations 3 or 4 times with the help of a high volume sampler. The results are compared with recommended ambient air quality standards and discussed from the viewpoint of human health hazards.

9403-046. Tripathi Anamika (Poll Eco Res Lab? Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Airborne lead pollution in the city of Varanasi, India.** *Atmospheric Env*, **28** (14) (1994), 2317-2323 [24 Ref].

Monitoring of lead in ambient air was undertaken in the city of Varanasi, India, over a period of 2 yr from January 1988 to December, 1989. Air samples were collected from 10 sampling sites and analysed by the Atomic Absorption Spectrometry method. Lead levels in India are found to be low compared to western countries. The highest concentration of Pb was recorded at Andhra Pul, a busy crossing in the city and lowest at Sarnath i.e. about 10 km away from the city centre. The experimental results obtained show that the automobile emission is the predominant source for lead pollution in the city.

Water Pollution

9403-047. Barnah AK, Sharma RN, Borah GC (Geosci Div, Regl Res Lab, (CSIR), Jorhat 785006, Assam). **Impact of sugar mill and distillery effluents on water quality of river Gelabil, Assam.** *Indian J Environ Hlth*, **35**(4)(1993), 288-293 [10 Ref].

Impact of sugar mill and distillery effluent on the water quality of Gelabil river in Assam, during the operational period of the mill and also after its closure have been studied during the year 1990-91. Concentrations of the toxic metals were below permissible levels. When the mill remained closed, the river water quality was in

permissible limits. 9403-048. Fender BS, Kharat RB (Dept Chem, Inst Sci, Nagpur 440001). Determination of trace metals in sediment from canals of coal fired power plant. *J. Indl Polln Contl*, 9(2)(1993), 89-92 [9 Ref]. Waste water discharged from- coal-fired power plant consist of higher amount of trace metals, which might be precipitated into sediment. Sediment samples were collected in canals of coalfired power plant, with the help of sediment grabber. These samples were prepared for trace metals, Cu, Pb, Zn, Ni, Co, Cd and Mn determination by atomic absorption spectrophotometry. The results are discussed.

9403-049. Gupta MK, Singh Vibha, Rajwanshi Poonam, Srivastava Shalini, Das Sahab (Dept Chem, Fac Sci, Dayalbagh Educational Inst, Dayalbagh, Agra 282005). **Fluoride in ground water at Agra.** *Indian J Environ Hlth*, 36(1)(1994), 4346 [14 Ref].

Most of the samples were well within the desirable limits prescribed by the Bureau of Indian Standards for drinking water for all the parameters analysed except magnesium in which only 11% samples were within the desirable limits. Although 71% of samples contained only less than 1.0 mg/L of fluoride, dental fluorosis was common in the study area indicating possible additional contribution of fluoride through air and food.

9403-050. Khulbe RD, Durgapal Anjala (Aquatic Mycopatho Lab, Dept Bot, Kumaun Univ, Nainital 263002). **Sewage mycoflora in relation to pollutants in Naini Tal, Kumaun Himalaya.** *Polln Res*, 13 (1) (1994), 53-58 [13 Ref].

Investigations were carried out in the drains of Naini Tal for a period of one year from April 1991 to March 1992 to assess the quality of sewer water with reference to fungal population, pH, conductivity and total solids. Fungal population showed significant positive correlation with total solids and conductivity and significant negative correlation with pH. The association of higher fungal density with the nutrient loading showed their good indication in relation to water pollution.

9403-051. Krishnamurthy SR, Bharati SG (Dept Life Sci, Kuvempu Univ, Sahyadri Coll Campus, Shimoga 577 203). **Distribution of iron in the surface waters of the polluted river Kali, around Dandeti, Karnataka, India.** *Env Eco*, 12 (2) (1994), 275-278 [30 Ref].

The distribution of iron in the surface waters of river Kali was investigated during June, 1987 and May, 1988. The iron values were well above the prescribed standards for water quality. The iron concentrations were more during monsoon at S. and S4 and during summer at S2 and S3 sampling stations. The fluctuations of iron values were directly correlated with pH at S1 and S2, and inversely proportional to pH at S3 and S4. The variations of dissolved organic matter and calcium also played an important role in the distribution of iron.

9403-052. Mehta BH, Bachewar MS (Dept Chem, Univ Bombay, Vidyanagri, Bombay 400 098). **Effect of polluted water on chemical constituents of Colocasia esculenta.** *Polln Res* **13** (1) (1994), 11-15 [7 Ref].

Colocasia esculenta leaves cultivated in the polluted areas near western and central sub-urban railway line was selected for the study of their mineral content and proximate analysis. The mineral like Ca, Mg, Fe, K, Cu, Zn and P were estimated using atomic absorption spectroscopy. These mineral levels were influenced by the polluted water used for cultivation.

9403-053. Mehta UC, Mahto M (Dept Bot, RS More Coll, Govindpur, Dhanbad, Bihar). **Status of pollution from major thermal power stations of Damodar basin in Biharzan assessment.** *Polln Res*, **13** (1) (1994), 89-90.

There are three major thermal power stations in the water catchment area of river Damodar, which utilise coal of 32-35 per cent ash content. An attempt has been made to assess the air and water pollution caused by the ash.

9403-054. Misra Virendra, Jaffery Farhat N, Viswanathan PN (Ecotoxicology Sec, Indl Toxicology Res Cent, PB 80, MG Marg, Lucknow 226001). **Risk assessment of water pollutant.** *Environ Monit Assess*, **22** (1) (1994), 29-40 [16 Ref].

The sources of toxic xenobiotics and different factors are considered during risk assessment of pollutants, and their impact on aquatic ecotoxicology is identified. A fugacity and multimedia compartment model is suggested, based on toxicodynamic and toxicokinetic considerations to predict and screen the behaviour of pollutants quantitatively in the aquatic environment. The significance of the risk analysis approach in anticipatory actions and regulation of pollution levels is discussed.

9403-055. Mittal SK, Rao ALJ, Singh Surinder, Kumar Ranjiv (Sch Basic Appl Sci, Thapar Inst Engng Techno, Patiala 147001). **Ground water quality of some areas in Patiala city.** *Indian J Environ Hlth*, **36** (1) (1994), 37-53.

In the walled city of Patiala, sewage outlets from buildings flow into an open nallah which passes over a distance of 12 kilometers. Parallel to the nallah on both sides are thickly populated residential areas, provided with hand pump tube wells as source of water for drinking and other purposes. Water samples were collected from these tube wells and analysed for potability, and the results are reported in this communication.

9403-056. Mahapatra PK, Patnaik LN, Misra Gadadhar (JK Paper Mills, Jeykaypur 765017, Orissa). **Water pollution due to a textile mill.** *J Indl Polln Contl* **9** (2) (1993), 51-63 [26 Ref].

The effluent quality of a textile mill in Orissa and its impact on the surrounding agricultural fields and the receiving water body, a rivulet, have been investigated, based on studies spread over two years. It is observed that the effluent of the mill which is far beyond the prescribed standards with respect to several water quality parameters, adversely affects the down-stream water of the rivulet rendering it unsuitable even for irrigation.

9403-057. Nirmal Kumar Jt (PG Dept Bot, Jai Hind Coll, Dhule MS 424002). **Chlorophyll-a content of certain aquatic plants.** *Polln Res*, **13** (1) (1994), 75-78 [15 Ref].

The current investigation deals with the chlorophyll-a content of different aquatic plants. Chlorophyll-a content was estimated bi-monthly in various hydrophyte communities present in Ratheshwar pond-Pariage India.

9403-058. Patel MK, Patel Tanoj Kumari (IDL Cheml Ltd, Quality Contl Dept, Rourkela 769016). **Assessment of water quality in the rivers of western Orissa: Part I-river Sankh.** *Indian J Environ Prot*, **13** (12) (1993), 909-916 [46 Ref].

Paper describes the status of water quality of river Sankh of the Western Orissa in India. In total 27 different water quality parameters were analysed from one sampling station and findings are described in this paper. A critical study of these analysed

parameters revealed that water of this river is not suitable for drinking purpose with respect to total solids, iron and cadmium. On the other hand, water of this river is perfectly fit for agriculture purpose.

9403-059. Pathak SP, Bhattacharjee DW (Aquatic Toxicology Div, Indl Toxicology Res Cent, Mahatma Gandhi Marg, PB No. 80, Lucknow 226001). **Effect of pollutants on survival of Escherichia coli in microcosms of river water.** *Bull Environ Contam Toxicol* **53** (2)(1994), 198-203 [12 Ref].

An attempt is made to assess the effect of aquatic pollutants on the survival of resistant as well as susceptible strains of Escherichia coli in the microcosm (micro-environment) of less polluted and highly polluted water of river Gomati in India at hourly intervals. Result indicates that the viable counts of both the test strains of E. coli in microcosms of upstream and downstream stations at hourly intervals significantly exhibited adverse effect of pollutants on bacterial survival.

9403-060. Pathak SP, Gopal K (Indl Toxicology Res Cent, PB No. 80, MG Marg, Lucknow 2260001). **Antibiotic resistance and metal tolerance among coliform sp. from drinking water in a hilly area.** *J Environ Bio*, **15** (2) (1994), 139-147 [124 Ref].

A total of 89 drinking samples from 56 springs, 28 dug wells and 5 streams were analysed for bacterial contamination. About 49.4% of samples showed presence of coliform sp. Recovery of Escherichia coli was maximum. All isolates also exhibited tolerance for different minimum inhibitory concentrations (MICs) of heavy metals (10 nos). Higher MICs of zinc, copper and lead were observed for 93.7%, 88.6% and 50% of isolates, respectively.

9403-061. Pathak Vandana, Banerjee AK (Chem Dept, Dr. HS Gour Univ, Sagar 470003). **Water pollution in coal mining areas of Madhya Pradesh: case study from Amlai and Damuha Colliery.** *Proc Acad Environ Bio* **3** (2) (1994), 233-239 [10 Ref].

Present study has been concentrated on mine water pollution especially coal mine areas of M.P. Studies on ground water with special reference to their quality may help in identification and removal of hazardous sub-surface and sub-surface water bodies. Physicochemical, microbial and instrumental studies were performed including

the determination of salinity, permeability, percentage of Na salt adsorption ratio, water quality indices in both the mines in summer, rainy and winter seasons.

9403-062. Paul AC, Parameswaran M, Pillai KC (Hlth Phys Div, Bhabha Atom Res Cent, Bombay 400085). **Trace metals and lanthanides in a tropical river environment.** *Water Air Soil Polln*, **74** (1&2) (1994), 141 - 153 [7 Ref].

The river Periyar in the State of Kerala is subjected to pollution from a number of industrial units such as zinc smelter, rare earth plant, phosphatic fertiliser unit etc. The levels of Zn and Cd in water and sediments in the river have in recent years increased ten fold as compared to a study conducted earlier during 1970. The levels of these trace metals in water increase at the backwater zone under high salinity in summer due to solubilisation from the sediments. Among the lanthanides Ce is the most predominant in water.

9403-063. Ramaiah N (Natl Inst Oceanogr, Dona Paula, Goa 403004). **Some aspects of microbiological characteristics in the nearshore waters of Bombay.** *Indian J Marine Sci* **23** (2) (1994), 75-81 [35 Ref].

Primary production, bacterial abundance their generic composition, some of their biodegradative enzymes and heterotrophic uptake of labelled glucose were examined from the waters of Bombay harbour-Thane creek-Bassein creek confluence. Extremely low mineralisation rate, as evidenced from poor microbial heterotrophic activity and fewer bacterial groups suggest environmental deterioration. Besides suggesting eutrophication, higher rates of primary production in the locations receiving industrial wastes were also important in discerning a non-stimulation of microbial mineralisation processes.

9403-064. Ratha DS, Sahu BK (Cent Std Resources Engng, Indian Inst Techno Powai, Bombay 400076). **Seasonal variation of geochemical data in sediment samples from two estuaries in western India.** *Indian J Environ Hlth*, **35** (4) (1994), 294-300 [7 Ref].

Linear discriminant analysis was carried out of trace elements concentration data of sediments collected from two estuaries (Thane creek and Ulhas river) in Bombay. Linear discriminant functions (L.D.F.) were established taking two populations at a time.

The variation in the concentration may be due to heavy rain fall in the region during monsoon.

9403-065. Ravichandran C, Padmanabhamurty B (Sch Environ Sci, Jawaharlal Nehru Univ, New Delhi 110067). **Acid precipitation in Delhi, India.** *Atmospheric Env* **28** (14) (1994), 2291-2297 [34 Ref].

Precipitation samples were collected on event basis at Jawaharlal Nehru University, New Delhi during 1991. pH, major cations and anions of the samples were determined and the ionic balance was calculated. In two consecutive months (August and September) during monsoon, the samples were found to be acidic. Although cations and anions decreased considerably, the hydrogen ion concentration increased with the increase of precipitation amounts during these months. Winds blowing from industrial areas in the E. SE may be the possible cause for acid precipitation in this season.

9403-066. Sahu BK, Singh BC, Mohanty AK (Utkal Univ, Dept Chem, Bhubaneswar 751004). **Trace metals in drinking water from different sources in Bhubaneswar.** *Indian J Environ Prot*, **13** (11) (1993), 831-835 [9 Ref].

A study was conducted for the determination of trace metals in drinking water from 5 different sources in the capital city of Bhubaneswar. The study was extended over a period of one year during 1992-93. Trace metals were determined in Kuakhai river water, municipality tap water, tube well water, open well water and Kedargouri spring water during every month from August, 1992 to July, 1993. Results showed seasonal fluctuations. Treatment process which comprised of coagulation, flocculation, sedimentation, filtration, and disinfection, was found to be effective in bringing down the trace metal levels in treated water considerably.

9403-067. Satyanarayana D, Panigrahy P. K, Sahu SD (Cheml Oceanogr Lab, Sch Chem, Andhra Univ, Visakhapatnam 530003 AP). **Metal pollution in harbour and coastal sediments of Visakhapatnam, east coast of India.** *Indian J Marine Sci*, **23** (1) (1994), 52-54 [9 Ref].

Extent of metal pollution in harbour sediments and its impact on the coastal region of Visakhapatnam have been evaluated using pollution load index (PLI). High PLI values of inner harbour (4.5) indicates a highly polluted zone which can be attributed

to the discharge of untreated domestic sewage and industrial effluents. Further, decreasing trend of pollution load index values from harbour to coastal region suggests dispersion and dilution of metal pollutants.

9403-068. Selvam V, Hariprasad V, Mohan R, Ramasubramanian R (MS Swaminathan Res Foundation, 3rd Cross Street, Taramani Instl area, Madras 600113). **Diurnal variations in the water quality of sewage polluted Adyar mangrove water, east coast of India.** *Indian J Marine Sci*, **23** (2) (1994), 94-97 [17 Ref]

Diurnal fluctuations of physico-chemical factors were studied at 2h interval over a period of 24h at a fixed location in the sewage polluted Adyar mangrove waters both when the mouth of the estuary was in closed and open conditions. When the water was stagnant due to sand bar formation, salinity showed no marked diel variations whereas when the mouth was in open condition salinity fluctuated widely with two peaks. When the mouth was closed, dissolved oxygen was below detection limit during the night hours but fluctuated during day time.

9403-069. Sharma M, Patel KS, (Dept Chem, Ravishankar Univ, Raipur 492010, MP). **Determination and speciation of antimony in waters.** *Int J Analyt Chem*, **50** (1) (1993), 63-71 [14 Ref].

A new spectrophotometric method for the determination and the speciation of inorganic antimony in waters is described. The value of molar absorptivity of the complex is $(1.54) \times 10^5 \text{ l mole}^{-1} \text{ cm}^{-1}$ at absorption maximum 640 nm. The detection limit of the method is 10 ng ml^{-1} . Of various tested ions, only Tl (III) caused serious interference in the determination of the analyte that was overcome by masking with EDTA. The present method has been applied for the analysis of inorganic Sb (III), Sb (V) and total Sb at lower, $\mu\text{g l}^{-1}$ levels in waters.

9403-070. Singh Balwinder, Bishoni S1t (Dept Soils, Punjab Agricl Univ, Ludhiana 141004). **Quality of underground irrigation waters in Barnala tehsils of Sangrur district (Punjab).** *Indian J Eco*, **20** (1) (1993), 17-21 [8 Ref].

Electric conductivity of water samples collected from 111 villages of Barnala tehsil (Sangrur district) varied from 350 to 2620 $\mu\text{hos cm}^{-1}$. EC was significantly correlated with RSC in all the blocks. Soluble boron and fluoride content of the water

varied from nil to 2.5, and 0.1. to 3.8 ppm respectively. Only 2.7 per cent water samples were found to be unfit due to high B content. Further, 69% water samples contained F more than 1ppm. Potassium and sulphate content of these waters varied from 0.1 to 1.6 and nil to 4.5 me 1⁻¹.

9403-071. Singh KP (Punjab State Coun Sci Techno, SCO: 2935-36, Sector 22-C, Chandigarh 160022t. **Temporal changes in the chemical quality of groundwater in Ludhiana area, Punjab, India.** *Curri Sci*, **66** (5) (1994), 375-378 [9 Ref].

The temporal changes in the chemical quality of groundwater of Ludhiana area have been studied. The results from 1983 to 1992 have been compared. The study indicates that samples containing cyanide have increased as it cannot be absorbed and remains in the hydrogeological environment. Other trace elements do not show any significant change. Remedial measures to control pollution of groundwater have been discussed.

9403-072. Singh MP, Verma BN (Univ Dept Bot, Bihar Univ, Muzaffarpur 842002). **Interactions amongst abiotic factors of a freshwater lake.** *Indian Botl Contactor* **10** (2) (1993), 63-68 [35 Ref].

Monthly observations were made for two consecutive years (September 1988 to August 1990) on the physicochemical quality of water of an Ox-bow lake at Muzaffarpur (Bihar) with reference to 12 parameters. Coefficient of correlations were computed amongst the parameters under consideration. It was found that the lake tended towards hardness mainly due to the constant accumulation of debris of heavy macrophytic growth (*Eichhornia* sp and *Azolla* sp) in the lake.

9403-073. Swain N, Sahu J, Adhikary SP (PG Dept Bot, Utkal Univ, Bhubaneswar 751004). **Studies on the water quality of Swetaganga Temple tank, Puri.** *Indian J Environ Hlth*, **36** (1) (1994), 47-50 [8 Ref].

Swetaganga is a small perennial water body located in the vicinity of Jagannath temple of Puri in the Orissa. Sampling for physico-chemical and phycological analysis of the tank water was made at monthly intervals on a clear day before noon during January 1989 to December, 1992. The important physico-chemical parameters viz. water temperature, secchi disc transparency, pH, dissolved oxygen concentration and total

nitrogen and phosphorus content of the tank water were studied following the methods as described in APHA.

9403-074. Verma JP, Mohanty RC (Environ Bio Lab, PG Dept Bot, Utkal Univ, Bhubaneswar 751004). **Evaluation of water quality of two freshwater ponds.** *Polln Res*, **13** (1) (1994), 69-74 [15 Ref].

The Nygaard's trophic state index values showed that both the ponds were eutrophic. Using Dresscher and Marks formula to study the degree of pollution and the saprobic phase it was found that pollution was comparatively less in pond 1 and the water body was under b-mesco/oligosaprobic, saproic phases with saprobicindex as 1.09 while pond 2 came under b-mesosaprobic phase with saprobicindex as 0.75.

9403-075. Verma NK, Jain OP, Shrivastava PK, Jyoti S (Dept Zoo, Motilal Vigyan Mahavidyala, Bhopal-8). **Preliminary studies on heavy metals in ground water of Mandideep by atomic absorption spectroscopy.** *Proc Acad Environ Bio*, **3** (1) (1994), 115-117 [6 Ref].

Paper reports the approach and preliminary results from a study of the metal content of the ground water Mandideep which is a newly developed industrial area of M.P. A Perkin Elmer Atomic Absorption Spectrophotometer (Model 2380) was used for spectral studies. Metals such as Mn, Pb and Cu were not found to be within detect-able limits in untreated water samples. Iron values were found to show variations from station to station.

Noise Pollution

9403-076. Nagi Gurpreet, Dhillon MK, Dhaliwal GS (13ept Home Manag, Punjab Agricul Univ, Ludhiana 141004). **Sources of noise pollution and its ill effects on rural and urban inhabitantts.** *Indian J Eco*, **20** (1) (1993), 67-73 [4 Ref].

The surveys conducted in two colonies of Ludhiana city and two villages of Ludhiana district revealed that the urban families experienced more noise nuisance from interior sources as compared to the rural folks. The excessive noise produced from

these sources leads to multifarious ill effects and reduced working efficiency among the people.

9403-077. Nagi Gurpreet, Dhillon K, Bansal AS, Dhaliwal GS (Dept Home Manag, Punjab Agricul Univ, Ludhiana 141004). **Extent of noise pollution from household equipment and appliances.** *Indian J Eco*, **20** (2) (1993) 152-156 [4 Ref].

The study of noise pollution was carried out in two colonies of Ludhiana city and two villages of Ludhiana district. An equal number of respondents were selected for the study. The household equipment and appliances used by these respondents to ease out home making work were listed down. The noise levels produced by the use of household equipment and appliances ranged from 40 dB(A) to 91 dB (A) which were quite high and intolerable as compared to acceptable noise level of 45 dB (A).

Ecology

9403-078. Ansari ZA, Parulekar AH (Natl Inst Oceanogr, Dona Paula, Goa 403004). **Ecological energetics of benthic communities of an estuarine system of the west coast of India.** *Proc Indian Natl Sci Acad*, **60** (1) (1994), 99-105 [26 Ref].

An attempt has been made to measure the biomass and quantify the production rates of different size groups of benthic organisms. The average annual production rates of microphytobenthos, meiobenthos and macrobenthos were estimated to be 42.68, 6.19 and 9.20 g cm⁻², respectively. It was inferred that the macrobenthic production gets a great deal of its energy source from the detritus rich sediment.

9403-079. Baruah Amitabh, Singh Dhrub K, Sinha Arbind K, Sharma Upendra P (PG Dept Zoo, Bhagalpur Univ, Bhagalpur 812007). **Diel sariation of phytoplankton in a tropical wetland of north Bihar.** *Env Eco*, **12** (1) (1994), 30-32 [9 Ref].

Diel variation of phytoplankton was studied during December 1992 in a wetland Kawar lake, Bihar. The phytoplankton density varied from a minimum of 274 unit/litre at 1900 hours to maximum of 1,479 unit/litre at 0300 hours. Altogether 21 species of phytoplankton were encountered throughout the study period among which the

dominance of different groups were as Bacillariophyceae > Chlorophyceae > Myxophyceae.

9403-080. Basheer Ahmed A, Ramaswamy PP, Ramdhas V (Fisheries Coll Res Inst, Tuticorin 628008). **Distribution of organic, matter in Tuticorin coastal waters.** *Indian J Eco*, **20** (1) (1993), 59-62 [4 Ref].

Temporal variation of the chemical and biochemical oxygen demand was investigated in four ecologically important biotopes of Tuticorin coastal waters. BOD did not show significant quantitative relationship with COD in all the four biotopes. Highest value of oxygen demand due to non biodegradable organic matter invariably coincided with the highest value of COD in all the biotopes, significant quantitative relationship existed between oxygen demand due to non-biodegradable organic matter and COD.

9403-081. Bilgrami KS, Kumar Sheo, Sahay SS, Kumar Sanjib (Univ Dept Bot, Bhagalpur Univ, Bhagalpur 812007). **Diel variations in abiotic and biotic factors of the river Ganga at Bhagalpur, Bihar,** *Env Eco*, **12** (2) (1994), 374-378 [18 Ref].

Diel variations in different physicochemical and biological characteristics of the river Ganga at Bhagalpur in different seasons were carried out. Atmospheric and water temperature, pH, phytoplankton density, total algal pollution index, and species diversity index were highest during summer season while values of total bacterial density total coliform and fecal coliform were maximum during monsoon season.

9403-082. Chatterjee Ashok Kumar (Orissa State Polln Contl Bd, A/118, Nilakantha Nagar, Unit-8, Bhubaneswar 751012, Orissa). **Benthos, the water quality indicator in river Brahmani.** *Indian J Environ Hlth*, **36** (1) (1994-) 24-30 [6 Ref].

Occurrence of benthos was studied in river Brahmani for a period of one year from eight locations. At Rourkela and Talcher Anugul, discharge of effluents to river Brahmani severely affected the distribution of benthic communities. BMWP score and benthic diversity index clearly indicate the degree of deterioration of water quality at these points whereas, similarity index reflects the changes of benthic fauna at two successive stretches.

9403-083. Chattopadhyay J, Tapaswi PK, Datta D, Chattopadhyay (Sarkar) D (Embryology Res Unit, Indian Statl Inst, 203, BT Rd, Calcutta 700035). **Formation of a dissipative structure: a non linear analysis.** *Ecol Modelling*, **73** (3 & 4) (1994), 205-214 [15 Ref].

A two species Lotka-Volterra diffusive system with interspecific competition has been considered. This system may give rise to the spontaneous emergence of a dissipative structure only in the presence of cross diffusion. The critical wave length just sufficient to perturb the system into local instability has been worked out. It also investigated the global behaviour of such types of dissipative structures with the help of a suitable Liapunov function.

9403-084. Chopra AK, Madhwal BP, Singh HR (Dept Zoo, Gurukula Univ, Hardwar 249404). **Relationship between abiotic variables and benthic fauna of river Yamuna in Garhwal Himalaya.** *Indian J Eco*, **20** (1) (1993), 53-58 [5 Ref].

The coefficient of correlation \otimes between abiotic variables and benthic fauna of river Yamuna showed that temperature and velocity had a significant negative while dissolved oxygen (DO) had a significant positive relationship ($p > 0.01$) with amphimeropterans, Trichopterans, Piecopterans and Coloepterans. Free CO_2 had significant negative correlation with Tri-chopterans ($p > 0.05$) and Piecopterans ($p > 0.01$) only.

9403-085. Choudhary Rajiv Kumar, Bil-grami RS (Dept Bot, RSS Coll, Chochahan, Muzaffarpur). **Effects of gaseous contents on bacterial and fungal population of two ox-bow lakes of river Burhi Gandak.** *Indian Botl Contractor*, **10** (1) (19933, 7-12 [14 Ref].

Effects of gaseous contents i.e. dissolved O_2 and free CO_2 on total bacterial and total fungal populations of Kamra and Paharpur lakes were examined. Free CO_2 contents exhibited direct correlation with bacterial density, while dissolved O_2 showed almost direct correlation with fungal population of lakes. Maximum fungal population was recorded during winter in Kamra lake and during monsoon in Paharpur lake. But, the bacterial concentration was highest during monsoon in both the lakes.

9403-086. Deb SC, Das KK, Santra SC (Natl Environ Engng Res Inst, Calcutta Zonal Lab, 23, RN Micherjee Rd, Calcutta 700001). **Studies on the productivity of sewage fed pond ecosystem.** *Proc Acad Environ Bio*, **3** (1) (1994), 33-42 [14 Ref].

Gross Primary Proxluactivity (GPP) of fish growing pond receiving sewage from the found to be in the range of 1.48 to 1.96 g O₂ m⁻² hr⁻¹. The chlorophyll content also showed marked variation seasonally. Statistical correlation of GPP, NPP, chlorophyll content and nutrient availability in water bodies has also been established.

9403-087. Deiva Oswin S, Kathiresan K (Cent Adv Std Marine Bio, Parangipettai 608502, Tamil Nadu). **Pigments in mangrove species of Pichavaram.** *Indian J Marine Sci.* **23** (1) (1994), 64-66 [13 Ref].

Monthly variations in pigments in leaves of eight mangrove species were determined. Pigment concentration varied between plant species and period of analysis. Pigments were high in species of Rhizophoraceae family. Chlorophylls and carotenoids were high during May to July, flavonoids during July-September and anthocyanian during October and November.

9403-088. Ghatak DB, Konar SK (Fisheries Lab, Dept Zoo, Kalyani Univ, Kalyani 741235). **Field survey on the status of pollution by various industrial effluents on Hooghly estuary ecosystem at Haldia, West Bengal.** *Env Eco*, **12** (1) (1994), 128-132 [15 Ref].

At Haldia various industrial effluents produced significant influence on planktonic population, benthic organisms of the Hooghly estuary ecosystems surrounding various discharge points. Dissolved oxygen, free carbon dioxide, phosphate and hardness of water were also affected significantly but no marked changes on pH and alkalinity were observed.

9403-089. Hazarika Arup K, Dutta AC (Dept Zoo, Cotton Coll, Guwahati 781001). **Limnological studies of two fresh water ponds of Guwahati, Assam.** *Env Eco*, **12** (1) (1994), 26-29 [24 Ref].

A comparative study of two fresh water ponds Dighali pukhuri and Ulubari fish pond were carried out during the pre-monsoon period (March-May), 1993. Ulubari fish

pond is managed and the other was unmanaged. The study revealed some variations of physicochemical characters of the fish ponds, showing ecological diversities. The managed pond was found to be suitable for fish culture.

9403-090. Jebanesan A, Selvanayagam M (PG Res Dept Zoo, Loyola Coll, Madras 600034). **Population dynamics of aquatic hemipterans in the river Cooum, Madras.** *J Environ Bio*, **15** (3) (1994), 213-220 [16 Ref].

River Cooum, finding its course right across the Madras City, is well known for its polluted status. The first three stations constitute the upstream and rest six come under the downstream. Downstream is highly polluted as evidenced by the increase in BOD, COD and free CO₂. The ecological difference between the species of aquatic hemiptera appear to depend upon physical and biological factors. Accordingly at pre-sent aquatic hemipterans in the upstream of river Cooum can be used as biological control agent for mosquito control.

9403-091. Joshi SN, Joshi TN, Tewari KC (Dept Zoo, Govt PG Coll, Pithoragarh 262502). **Diurnal cycle of abiotic parameters of a hillstream, Kalpanigarh from Kumaun Himalaya.** *Env Eco*, **12** (1) (1994), 18-21 [13 Ref].

The diurnal cycle of abiotic factors of a hillstream Kalpanigarh (Pithoragarh) was studied during rainy season. Air temperature showed greater variations than water temperature during diurnal cycle. The water was slightly turbid during diurnal rhythm. Dissolved oxygen and oxygen saturation percentage exhibited a positive relationship with the diurnal temperature.

9403-092. Kerkar Vijaya (Bot Dept, Goa Univ, Goa 403203). **Mineralogical studies on calcareous algae.** *Curr Sci*, **66** (5) (1994), 381-382 [4 Ref].

Calcium carbonate deposition in 17 algal species was studied using X-ray diffraction technique. Argonite was the predominant mineral deposit in chlorophytic genera: *Ilalimeda*, *Udotea*, *Acetabularia*, Phaeophytic genus: *Padina* and Rhodophycean genera: *Actinotrichia* and *Cheilosporum* high magnesium calcite was the predominant mineral. Halite, illite. quartz and feldspar were the major contaminants from surrounding media.

9403-093. Kotangale JP, Ghosh TK, Godkari Anuradha (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Diversity of zooplankton and benthos at Dahanu, Danda and Sasta creeks in west coast of India.** *Proc Acad Environ Bio*, **3** (1) (1994) 1-8 [8 Ref].

The creeks Dahanu, Danda and Savta are located at about 111 km from northern limit of Bombay towards Ahmedabad where a 500 MW Thermal Power Station is coming up. The creek water samples were analysed extensively for diversity of zooplankton and benthos. Among the major taxonomic groups, copepoda was the most dominant zooplankton and nematodes outnumbered other meio and macro benthos. Microbenthos was mostly dominated by bivalves, gastropods and polychaetes.

9403-094. Kumar S, Dutta SPS (Dept Biosci, Univ Jammu, Jammu). **Population dynamics of cladocera in a subtropical pond, Jammu.** *Indian J Environ Hlth*, **36** (1) (1994), 19-23 [16 Ref].

The abundance species diversity and total population of cladocera in a pond at Kunjwani, Jammu were studied from April 1989 to March 1990. The samples collected from four sites represented sixteen cladocera species. They exhibited a trimodal pattern with first peak in June, second in December, and third in February. Cladocera were statistically correlated with different physicochemical and biological factors.

9403-095. Mani P (Centl Polln Contl Bd, South Zonal Office, 6 West of Chord Rd, II Stage, Rajaji Nagar, Bangalore 560086, Karnataka). **Phytoplankton in Pichavaram mangroves, east coast of India.** *Indian J Marine Sci*, **23** (1) (1994), 22-26 [9 Ref].

Marked seasonal cycle with premonsoon and summer peaks were observed. Monsoon season showed low population density. Surface area and plasma volume of phytoplankton population revealed the importance of cell-size characteristics in quantitative analyses. Thirtyone species were identified as bloomformers, with *Rhizosolenia alata* f. *gracillima* attaining a maximum bloom concentration of $2881 \times 10^7 \mu\text{m}^2 \text{ l}^{-1}$.

9403-096. Meghara; M, Madhavi DR, Sreenivasulu C, Umamaheswari A, Venkateswarlu K (Dept Bot, Nagarjuna Univ, Nagarjunasagar 522510). **Biodegradation of**

methyl parathion by soil isolates of microalgae and cyanobacteria. *Bull Environ Contam Toxicol*, **53** (2) (1994), 292-297 [20 Ref].

A microscopic examination was made for the qualitative occurrence of microalgae and cyanobacteria in insecticide-treated soil enrichments. A total of 10 species including 3 unicellular green algae and 7 filamentous cyanobacteria were recovered. The most abundant species were *Lungbya gracilis*, *Nostoc punctiforme*, *Oscillatoria animalis* and *Phormidium foveolarum*. The role of microalgae and cyanobacteria in biodegradation of methyl parathion was tested by measuring the rate of disappearance of the insecticide and its major hydrolysis product, p-nitrophenol (PNP), from the culture media. All the six species hydrolyzed the insecticide at an appreciable rate as evidenced by the appearance of PNP in the culture medium.

9403-097. Paulsamy S, Rathinasmy R, Manian S (Dept Bot, Kongunadu Arts Sci Coll, Coimbatore 641 029). **Studies on primary productivity in a freshwater ecosystem of Bhavanisagar reservoir.** *Indian Botl Contractor* **10** (1) (1993), 29-31 [5 Ref].

Primary productivity of Bhavanisagar Reservoir, Tamil Nadu State was studied over a period of six months (December, 1986 to May, 1987). The upstream site showed higher level of nutrients, dissolved oxygen and primary productivity than the reservoir proper. The productivity decreased with the advent of summer. The study indicated the oligotrophic nature of the reservoir. Fertilization of phytoplankton is recommended to make the fish culture programme viable.

9403-098. Prakash Anand, Saxena Ran-jana, Sar CK (Lab Fisheries Bio, DAV (PG) College, Meerut Univ, Muzaffarnagar 251001). **Environmental stress in Pandoh reservoir, India, renders snowtrout unpalatable.** *Environmentalist* **14** (1) (1994), 63-67 [10 Ref].

The thermo-altitudinal migration of *Schizothorax richardsonii* (Gray), the snowtrout, downstream during the winter months in search of favourable habitats, is now obstructed by the Pandoh Dam, situated on the River Beas in Himachal Pradesh. In search of periphyton, the fish is forced to feed upon the bottom mud and sand of the reservoir. The unusual food intake adversely affects the palatability of the fish, its flesh loses taste and emits a foul odour.

9403-099. Rajakumar R, Ramanibai R. Devaraj Niranjali (Dept Zoo, Univ Madras Madras 600025). **Observations of species (plankton)-environment relationship in urba aquatic ecosystems.** *J Environ Bio* **15** (3) (1994), 177-183 [11 Ref].

Present study deals with the species environment relationships in urban and rural habitats in water bodies of the Madras city. Physico-chemical parameters and their relationships with phyto and zoot lanktons were analysed by using canonical correspondence analysis. A fundamental change in the environmental aspect of water bodies in the urbanised areas and the species associations were environmental rather than nutrient regimes unlike in the rural habitats where the planktons were related to nutrients.

9403-100. Ramachandra Rao CSV, Krishnamurthy K (Cent Adv Std Marine Bio, Annamalai Univ, Parangipettai 608502). **Chemoheterotrophy in the mangrove environment.** *Curr Sci* **66** (5) (1994), 382-385 [5 Ref].

The unique characteristics of the mangrove ecosystem of the tropics are discussed. This ecosystem is endowed with a diversity of habitats within it and is chemoheterotrophic in nature. The production of photosynthetic prokaryotes under chemoheterotrophic conditions is discussed. Nitrogen fixation by planktonic cyanobacteria to augment nitrogen budget of the ecosystem has been worked out.

9403-101. Reddy AN, Reddeppa Reddi K (Oil Natural Gas Commn, Regl Lab, Gowri Bldgs, First Lane, Nungambakkam High Rd, Madras 600064). **Seasonal distribution of foraminifera in the Araniar river estuary of Pulicat, southwest coast of India.** *Indian J Marine Sci*, **23** (1) (1994), 39-42 [7 Ref].

A total of 46 foraminiferal species have been recorded. The lower estuarine region is characterised by low range of variability and high abundance of foraminiferal counts, while the upper estuary by low range of variability and low faunal abundance. The living assemblages have limited number of species with *Ammonia baccarii* being dominant in all seasons. Of the various ecological parameters studied salinity, pH and calcium have a close bearing on the distribution and abundance of foraminifera in the estuary.

9403-102. Roy Choudhuri PK (Calcutta Port Trust, West Bengal). **Preliminary observation on control of slumping through mangrove afforestation at Nayachara, West Bengal (India)-a case study.** *Indian Forester*, **120** (5) (1994), 395-399 [2 Ref].

Paper deals with the prospect of raising mangrove plantation at Nayachara in the Midnapore district far away from the mangrove habitat. The plantation were initiated during the year 1990 and covered foreshore areas of Nayachara along the river Hooghly. Transplanting of longer and stouter nursery raised mangrove seedling in polypack in the interspaces of laterite boulders over geo-jute covering should ensure better performance in vulnerable areas.

9403-103. Santhanam R, Srinivasan A, Ramadhas V, Devraj M (Fisheries Coll Res Inst, Tamil Nadu Vet Anim Sci Univ, Tuticorin 628008, Tamil Nadu). **Impact of Trichodesmium bloom on the plankton and productivity in the Tuticorin bay, southeast coast of India.** *Indian J Marine Sci*, **23** (1) (1994), 27-30 [12 Ref].

Trichodesmium thiebautii bloom was noticed on 2 March, 1989 in Tuticorin bay, and hydrobiological investigations were carried out between 2 and 8 March, 1989, when the bloom culminated. While the water temperature, salinity, nitrite, phosphate and particulate organic carbon showed generally higher values in association with maximum bloom density, dissolved oxygen and nitrate concentration recorded minimal values. Density of T. thiebautii ranged from 0.01 to 17.5×10^6 filaments l^{-1} during bloom period.

9403-104. Satyanarayana D, Sahu SD, Panigrahy PK (Cheml Oceanogr Div, Sch Chem, Andhra Univ, Visakhapatnam 530003, AP). **Distribution of phytoplankton pigments and particulate organic carbon in the coastal waters of Visakhapatnam (Bay of Bengal).** *Indian J Marine Sci*, **23** (1) (1994), 47-51 [25 Ref].

Phytoplankton pigments and particulate organic carbon (POC) revealed temporal and spatial variations in the coastal waters of Visakhapatnam. Chlorophyll-a (chl-a) and POC exhibited major peaks in pre and postmonsoon seasons which were attributed to higher planktonic production as a result of upwelling in the former, and favourable marine conditions in the latter. The integral mean concentration (IMC) of chl-a showed a decreasing trend from coast to offshore indicating higher fertility near the coast.

9403-105. Swaminathan K, Gowrishankar N, Gurusamy R (Dept Biotechno, Bharathiar Univ, Coimbatore 641 046). **Studies on seasonal variation in soil mycoflora of a lake ecosystem.** *Indian Botl Contractor*, **10** (2) (1993), 51-57 [17 Ref].

Seasonal variation in soil mycoflora of a lake ecosystem was studied for a period of twelve months over three seasons. The maximum number of species were observed during rainy season and the maximum population during winter. Throughout the study period soil. samples from a depth of 0-15 cm contained high number of fungal species and population, as compared to those at 15-30 cm and 30-45 cm depths.

9403-106. Swarnalatha N (Dept Bot, Osm ania Univ, Hyderabad). **Seasonal rhythms of various physicochemical charateristics of a lake.** *J Mendel*, **11** (1 & 2) (1994), 65-66 [19 Ref].

Seasonal changes of various physico-chemical parameters have been studied for a period of two years in Saroor Nagar lake. Nitrates, total dissolved and suspended solids have been increased during monsoon which might be due to surface run off water. On the other hand, chlorides and phosphates rose to optimum during summer which might be due to bright sunshine and increased temperature. D.O. and organic matter also increased during summer.

9403-107. Trivedi RN, Srivastava Anjani K, Prasad Dinesh, Raquib Abdul (Univ Dept, Magadh Univ, Bodh Gaya 824 234). **Algal bioassay studies as environmental indicator of local ponds of Patna.** *J Mendel*, **11** (1 & 2) (1994), 69-70 [6 Ref].

Algal bioassay studies using a filamentous blue-green alga *Anabaena cylindrica* have been attempted to monitor water chemistry and nutrient impact on the environmental condition of two fresh water ponds at Patna. *Anabaena cylindrica* growth pattern was studied in pond waters and culture media separately. The variation in pond water indicates the impact of phosphate in the eutrophic waterbody.

9403-108. Verma DC, Mehrotra RK, Misra PK (Dept Bot, Lucknow Univ, Lucknow 226007). **Blue green algae and diatoms of polluted and unpolluted zones of river Gomati at Lucknow (UP).** *New Botanist*, **20** (1-4) (1993), 159-165 [33 Ref].

Paper deals with the collection and identification of blue-green algae and diatoms of river Gomati at Lucknow. The studies were carried out for a period of one year extending between May 1990 to April 1991. A total of sixty five taxa belonging to Cyanophyceae and Bacillariophyceae were recorded from four different locations in the course of river Gomati.

Nature and Natural Resources Conservation

9403-109. Adhikari RN, Rama Mohan Rao MS, Pradhan IP, Padmaiah M (Centl Soil Water Conserv Res Trng Inst, Res Cent, Bellary, Karnataka). **Soil and water conservation measures in mine spoil areas.** *Indian Forester*, **120** (4) (1994), 349-360 [8 Ref].

The mine area is treated with conservation measures like trench mound planting with different tree species, control of gullying by erecting gabion structures and providing vegetative checks. The detailed results about the catchment characteristics, construction of gabions, plantations, silt load estimations, grading analysis etc. are presented in detail.

9403-110. Karnatak DC (Forest Res Inst, Dehra Dun). **The Dziiko Valley-an ecological study.** *Indian Forester*, **120** (4) (1994), 328-330.

The study is based on the visit of the Dziiko Valley by the Wildlife Wing of Manipur Forest Department for exploring it for the creation of a National Park. The valley, bordering Manipur and Nagaland States, presents a unique assemblage of fauna and flora which need protection by the government against human onslaught so as to pre-serve the rich germplasm in its ecological niche.

9403-111. Khan MA (Dept Bot, Univ Kashmir, C/o PB No. 726, GPO, Srinagar 190001, Kashmir). **Euglenoid red bloom contributing to the environmental pollution of Dal Lake, Kashmir Himalaya.** *Environ Conserv*, **20** (4) (1993), 352-356 [17 Ref].

The Lake's ecology has been deteriorating in proportion to pressures applied by a surging population and associated anthropogenic perturbations. The development of this euglenoid bloom causing red coloration is a recent addition to the Lake's

environmental pollution. The paper concerns the development and seasonal succession of the euglenoid population in Dal Lake in relation to the environmental variables of the ecocomplex .

9403-112. Mao AA, Katakai SK (Botl Surv India, Eastern Circle, Shillong (Megha-laya). **Dziiko Valley: a plea for conservation.** *Indian Forester* **120** (6) (1994) 515-518 [2 Ref].

Dziiko Valley is situated on the border of Nagaland and Manipur States. Its flora is diverse and unique which gives an impression at first sight of the well known 'Valley of Flowers' in the Garhwal Himalayas. The nature's gift would one day vanish, if the present trend of biotic interference goes on. Hence, immediate conservation of the Dziiko Valley is necessary.

9403-113. Naik GR, Seetharam YN, Ravindranath GE, Kotresh K (Dept PG Std Res Bot, Gulbarga Univ, Gulbarga 585106). **Effect of limestone mining on the vegetation around Kurkunta, Gulbarga.** *Proc Acad Environ Bio*, **3** (1) (1994), 77-81 [11 Ref].

In Karnataka, Gulbarga district has huge deposition of limestone. Mining and quarrying activities for the last twenty years have done considerable damage to the vegetation and soil condition. Present investigation is on soil factors, vegetation and future plan for management of the land by developing a better vegetation and crop pattern to overcome the damage due to continuous mining activities.

9403-114. Prasad KG, Sharma SD (Forest Soils Land Reclamation Div, Forest Res Inst, Dehra Dun). **Salt affected soils of Indo-Gangetic plains.** *Indian Forester*, **120** (4) (1994), 361-367 [6 Ref].

Some salt-affected soils of Indo-Gangetic plains were characterised and classified in accordance with soil taxonomy. Petrocalcic Natrusalf were of wider occurrence and identified in Kurukshetra Forest Division and Gurgaon Social Forestry Division, Haryana and Patiala Forest Division, Punjab. However, Typic Natrustalf and Salor-thidic Natrustalf also OCCUt in Kurukshetta Forest Division.

9403-115. Rai Suresh Chandra, Sharma Eklabya, Sundriyal Rakesh Chandra (GB Pant Inst Himalayan Env Dev, Sikkim Unit, PO Tadong, Sikkim 737102). **Consereation in the**

Sikkim Himalaya: Traditional knowledge and land-use of the Mamlay watershed.

Environ Conserv, **21** (1) (1994), 30-34, 56 [11 Ref].

National conservation strategies, and inter-national strategies for linking conservation with development, are important for sustain-able development. At the same time regional strategies are equally or rather more important. Watersheds are being considered as a unit for analysis of the natural resource-base and development planning in the hills; therefore, the case of the Mamlay watershed in the Sikkim Himalaya is presented here to show the importance of land-use towards conservation. The paper also deals with age-old traditional practices which have many conservation implications.

Health and Toxicology

9403-116. Agarwal HC, Singh DK, Sharma VB (Dept Zoo, Univ Delhi, Delhi 110007).

Persistence metabolism and binding of p,p'-DDT in soil in Delhi, India. *J Environ Sci Hlth*, **B29**(1) (1994), 73-86 [19 Ref].

The persistence, metabolism and binding of ¹⁴C-p,p'-DDT in soil were studied for two years under field sub-tropical conditions in Delhi, India. Two experiments were conducted at initial concentrations of 3.7 and 12.8 ppm and it was shown that about 80% of the DDT was lost from the soil in two years. The half life of DDT was 319 and 343 days in the two experiments. At zero-time p,p'-DDT accounted for 93-95% of the extractable residues. Gradually, the pro-portion of p,p'-DDT declined with time to 58-71% of the extractable residues after two years.

9403-117. Agarwal HC, Singh DK, Sharma VB (Dept Zoo, Univ Delhi, Delhi 110007).

Persistence and binding of p,p'-DDE in soil. *J Environ Sci Hlth*, **B29**(1) (1994), 87-96 [11 Ref].

Soil was treated with ¹⁴C-p,p'-DDE and left under field conditions for 545 days. The dissipation of the chemical was apparently biphasic; half life of dissipation 271 days. After one year, 61% of the initially applied radiocarbon was lost from soil. Methanol-extractable residues declined to about 29% after one year and were shown by TLC and HPLC to contain mainly p,p'-DDE and a small amount of DDMU.

9403-118. Agarwal HC, Singh DK, Sharma VB (Dept Zoo, Univ Delhi, Delhi 110007). **Fate of parathion in soil under sub-tropical field conditions.** *J Environ Sci Hlth*, **B29**(1) (1994), 189-194 [10 Ref].

Persistence, metabolism and binding of ¹⁴C-parathion in alkaline sandy loam soil under sub-tropical conditions of Delhi were studied for 545 days. After 3 days of treatment, ¹⁴C-residues declined to 41% of the amount applied. The dissipation curve was biphasic; an initial rapid phase followed by slow dissipation. The half life of dissipation was only 3.36 days for the first phase and 84 days for the slow phase. The overall half life was 64.5 days. The total residues at zero-time were 10.65 µg/g dry soil and were almost totally extractable.

9403-119. Ahi Janak (Dept Zoo, Dr HS Gour Vishwavidyalaya, Sagar 470 003). **Histopathological effects of hexachlorocyclohexane (HCH) on the midgut of adult *Poecilocus pictus* (Fabr.) Orthoptera: Acrididae.** *Proc Acad Environ Bio*, **3**(1) (1994), 59-63 [13 Ref].

The effect of hexachlorocyclohexane (HCH) on the midgut was observed from 4 to 16 days after treatment. Some usual secretions of exocrine and holocrine nature were seen in the midgut, still tissue stress was noticed in the regenerative nidi, which abnormally increased in size and number, the cellular epithelium, the nuclei, the striated border, the musculature and the peritoneal membrane. The cells of the regenerative nidi proliferated rapidly and increased in size and number.

9403-120. Ahmad Sarfaraz, Singh Vinita, Rao GS (Petroleum (Energy Resources) Toxicity, Indl Toxic Res Cent, PB 80, Lucknow 226 001). **Antioxidant potential in serum and liver of albino rats exposed to benzene.** *Indian J Exptl Bio*, **32**(3) (1994), 203-206 [35 Ref].

Administration of benzene consecutively for 10 days to male and female rats resulted in decrease in antioxidant potentials in serum. Serum uric acid and albumin showed significant decrease in all groups exposed to benzene. Increase in liver lipid peroxidation and decrease in content of free sulphahydril group were observed in rats exposed to benzene. Serum ferroxidase activity, total iron content (TIC) and total iron

binding capacity (TIBC) in female rats exposed to benzene showed significant decrease in ferroxidase activity without any change in TIC or TIBC when compared to control.

9403-121. Banerjee Meenakshi, Sharma Amit (Algal Res Unit, Dept Biosci, Bhopal Univ, Bhopal 642 026). **Mitigating effect of algal filtrate on Pb²⁺ toxicity in Anabaena flos aquae.** *Polln Res*, **13**(1) (1994), 59-62 [14 Ref].

Anabaena flos aquae was found to be protected from Pb²⁺ toxicity by supplementing algal filtrate of a rice field cyanobacterium Aulosira fertilissima in different combinations with medium. This filtrate with medium in the ratio 3:1 respectively when used in the presence of metal was found to restore and enhance growth and nitrate reductase activity. This study clearly suggests that Pb²⁺ toxicity in nitrogen fixing cyanobacterium may be counterbalanced by either the filtrate acting as chelator due to the presence of polysaccharides or as a source of nitrogen due to the presence of amino acids.

9403-122. Bharathi Ch (Dept Zoo, Andhra Univ, Visakhapatnam 530 003). **Toxicity of insecticides and effects on the behaviour of the blood clam Anadara granosa.** *Water Air Soil Polln* **75**(1&2) (1994), 87-91 [22 Ref].

The toxicity of organophosphate insecticides, mainly phosphamidon, monocrotophos and dichlorvos to the blood clam Anadara granosa, occurring in Kakinada Bay of the Godavari estuarine system was measured. The LC₅₀ values of three insecticides for 24, 48, 72 and 96 hr exposure ranged from 4.26, to 11.53 mg L⁻¹ for phosphamidon, 3.50 to 9.31 mg L⁻¹ for monocrotophos and 1.79 to 6.20 mg L⁻¹ for dichlorvos. Dichlorvos proved highly toxic even at low concentrations compared to either phosphamidon or monocrotophos.

9403-123. Bhardwaj AC, Tyagi Neelam (PG Dept Zoo, Sanatan Dharm Coll, Muzaffarnagar 251 001). **Inhibitory disturbances in odonate midgut alkaline phosphatase activity due to malathion and aldrin toxicity (Libellulidae: Odonata).** *Proc Acad Environ Bio* **3**(1) (1994), 17-20 [13 Ref].

Inhibitory disturbances in midgut alkaline phosphatase activity followed, varied concentration of malathion and aldrin immission on Pantala flavescens Fabr., have been evaluated. The progressive inhibitory trend of the pesticides on the enzyme activity was

observed. The pesticide concentration (5×10^{-4}) was least effective, producing 15 to 22 percent enzyme inhibition.

9403-124. Bhatnagar MC, Tyagi Meenakshi, Bana AK (Dept Zoo, Meerut Coll, Meerut 250 001). **Malathion poisoning to Clarias batrachus: a histological study.** *Prod. Acad Environ Bio*, **3** (1) (1994), 119-123 [15 Ref].

Liver, kidney and gills of *Clarias batrachus* treated with 3.83 ppm of malathion for 15 and 30 days respectively, exhibits severe damage in their histological architecture., After 15 days the polygonal shape of hepatocytes was greatly disturbed followed by necrosis, space formation, blood cells accumulation. Enlargement of nuclei and their migration towards the lumen of uriniferous tubules in renal tissue apart from shrinkage of glomerular tuft were greatly marked.

9403-125. Bhunia AK, Marik, R, Banerjee SK (Dept Biochem, Univ Coll Sci, Univ Calcutta, 35 Ballygunge Circular Rd, Calcutta 700 019). **Biochemical effects of carbaryl on nitrogen assimilating enzymes of cyanobacteria Nostoc muscorum.** *Bull Environ Contam Toxicol*, **52**(6) (1994), 886-892 [15 Ref].

Effect of carbamate insecticide carbaryl on growth, nitrogen assimilating enzymes like nitrogenase, nitrate reductase (NR) glutamine synthetase (GS) and photosynthesis and respiration of cyanobacteria *Nostoc muscorum* has been studied. Results indicate that growth retardation of the cyanobacteria occurred in a dose dependent manner of carbaryl. Significant enhancement of respiration rate was at 10 mg/L and above concentrations of carbaryl exposure. The nitrogenase activity was reduced significantly in presence of carbaryl except at 5 mg/L. Both nitrate reductase and glutamine synthetase activities were reduced significantly at 10 mg/L and above concentrations of carbaryl exposure.

9403-126. Bihari V, Srivastava AK, Gupta BN (Epidemiology Div, Indl Toxicology Res Cent, PB No. 80, MG Marg, Lucknow 226 001). **Health risks of fishing industry.** *Indian J Occupat Hlth*, **36**(3) (1993), 71-76 [11 Ref].

Fishing industry plays an important role in the economy of our country. It helps in augmenting food supply, generating employment, raising nutritional level of the

population and earning foreign exchange. The present paper is an effort to document the health risk and consequent morbidity prevalent in this group.

9403-127. Chattopadhyay BP, Jane Alam SK, Bandyopadhyay B, Gangopadhyay PK (Regl Occupl Hlth Cent, (Eastern), 3, Dr. M Ishaque Rd (Kyd Street), Calcutta 700 016). **Study to evaluate the occurrence of byssinosis among jute mill workers by clinical history and acute and chronic changes of forced expiratory volume.** *Indian J Environ Prot*, **13**(12) (1993), 903-908 [17 Ref].

Present study is undertaken to evaluate the effect of jute dust in producing byssinosis. The study was conducted on 35 workers of different departments of 2 jute mills. The ventilatory function of the workers were measured 2 times, at the before shift and after shift on the first day of work after weekend rest. It was observed that 8 (22.86%) workers had a typical chest tight-ness on the first day of work after weekend. The acute changes of forced expiratory volume in one second (FEV.) were observed in 9 (25.71%) workers and chronic changes of FEV. were also found in 7 (20.00%) workers.

9403-128. Chaudhari Ravindra D, Kulkarni AB (Biocheml Lab, Dept i Loo, Marathawada Univ, Aurangabad 431004). **Alterations in the carbohydrate metabolism due to monocrotophos toxicib of the terrestrial snail Zootecus insularis.** *Env Eco*, **12** (1) (1994), 119-122 [22 Ref].

The pest land snail, Zootecus insularis was exposed to the sublethal dose of monocrotophos for 1, 7 and 14 days. The total glycogen content in the whole soft body was decreased significantly (35.22%) at the end of lay 14 exposure. A sudden increase in the glucose level after first day exposure was noticed and then the level was decreased significantly. The reducing sugar level declined remarkably (58.17%) at the end of (tay 14 exposure.

9403-129. Chaudhary Seema, Sahai S (Dept Zoo, Dr. HS Gour Vishwavidyalaya, Sagar 470003). **Effect of lindane a y-isomer of benzene hexachloride on the spleen on albino rat.** *Proc Acad Environ Bio* **3** (1) (1994), 93-97 [8 Ref].

100 mg/kg body weight of technical grade of lindane (a sublethal dose) was injected in albino rats with olive oil once a week for 6 weeks. Controls were injected simultaneously with olive oil. The animals were sacrificed 24 hrs. after the last injection

and then dissected out for histological study. In both treated male and female animals the red and white pulp and also the central arteries were reduced and deformed when compared to controls. Space formation and splitting of cells was also observed in the spleen.

9403-130. Chinoy NJ, Barot W, Michael Mathews, Borot JM, Purohit RM, Ghodasara NG, Pari'kh DJ (Reproductive Endocrino Toxicology Unit, Dept Zoo, Univ Sch Sci, Gujarat Univ, Ahmedabad 380009). **Fluoride toxicity studies in Meshana district, North Gujarat.** *J Environ Bio*, **15** (3) (1994), 163-170 [20 Ref].

The data of the present study revealed that the fluoride content in serum of fluorotic population from endemic areas was significantly higher as compared to control. Haemoglobin content in fluorotic cases was comparatively lower with respect to control subjects of Ahmedabad city. This might also be due to malnutrition in these cases. The serum cholesterol levels in fluoride afflicted individuals were not altered, hence cholesterol metabolism was unaffected.

9403-131. Devaraj P, Selvarajan VR, Durairaj S (Dept Zoo, Univ Madras, Guindy Campus, Madras 600025). **Electroencephalogram of fish *Oreochromis mossambicus* during phosalone toxicity.** *Proc Acad Environ Bio* **3** (2) (1994), 149-154 [16 Ref].

Brain waves from cerebral hemispheres, dien/mesencephalon, cerebellum and medulla oblongata of fish, *Oreochromis mossambicus* exposed to LGo (4.6 ppm) of phosalone for 96 hr showed decrease in frequency, amplitude and total work done. The different wave patterns due to organophosphorus toxicity were decreased significantly ($p < 0.001$) at 96 hr and such decreases revealed differential sensitivities of the brain regions to phosalone.

9403-132. Dhawan S, Srivastava SC (Dept Zoo, Univ Lucknow, Lucknow 226007). **Chronic effect of commercial BHC on cardiac electrophysiology.** *Env Eco*, **12** (2) (1994), 271-274 [13 Ref].

A group of *Rattus norvegicus* was given chronic exposure to 50 ppm of gamma-hexachlorocyclohexane. Their cardiac observations were recorded with the help of electrocardiograms. On day 9 of exposure incomplete depolarization, slow repolarization

and shortening of resting polarized state of the heart were observed. Normalization took place after 3 days of end of long term exposures.

9403-133. Dious SRJ, Kasinathan R (CAS Marine Bio, Annamalai Univ, Parangipettai 608502, Tamil Nadu). **Biochemical composition and trace metals content of pulmonate snails *Cassidula nucleus* and *Melampus ceylonicus*.** *Indian J Marine Sci* **23** (2) (1994), 120-122 [18 Ref].

Biochemical composition and trace metals content of *Cassidula nucleus* and *Melampus ceylonicus* were studied. Meat weight, water content, dry weight, protein, carbohydrate and lipid varied with the reproductive cycle of the organisms. Fe showed high and Cu showed low concentrations of metals analysed. Absence of gills and wide mantle surface prevented high metal accumulation, hence the concentrations were more or less uniform throughout the year in both species.

9403-134. Gangopadhyay PK, Bhat-tacharyya SK, Mazumdar PK, Ahmad S, Chatterjee MK (Regl Occupl Hlth Cent (E), 3, Dr. M Ishaque Road, Calcutta 700016). **Occupational health problems of mica processing male workers.** *Indian J Indl Med* **40** (I) (1994), 8-19 [12 Ref].

Seven initial operations of mica processing industries were studied for environmental assessment. 463 workers in different operations and 123 controls of similar socioeconomic status were subjected to health evaluation. The duration of exposure of the workers to mica dust in the different processes varied from 9.18 + 6.24 to 15.96 + 9.43 yrs. Clubbing, abnormal breath sounds including crepitations (mainly basal) were observed in a larger proportion of the exposed group. The differences in prevalence of symptoms and signs between the exposed and control groups were statistically significant.

9403-135. Garg Poonam, Viswanathan Vivek, Singh Jaswant (Natl Botl Res Inst, Lucknow 226001, UP). **Cadmium-induced variations in phenolics, polyphenol oxidase and peroxidase in *Marsilea minuta* Linn.** *J Environ Sci Hlth A29* (7) (1994), 1323-1333 [15 Ref].

Exposure of *Marsilea minuta* to cadmium chloride under experimental conditions upto 96h, caused increase in phenolics, peroxidase and polyphenol oxidase, along with

ultrastructural changes indicating senescence. These results were discussed in relation to the cadmium induced pathomorphological changes.

9403-136. Gayatri R, Chatterjee S (Sch Life Sci, Jawaharlal Nehru Univ, Delhi 110067). **Morphogenesis of Dictyostelium discoideum treated with lindane.** *Bull Environ Contam Toxicol* **52** (6) (1994), 871-877 [17 Ref].

Effect of lindane on the development stages of Dictyostelium discoideum has been studied. Control Dictyostelium cells showed normal morphogenesis which was completed within 24 hr. While the morphogenesis was delayed and abnormal in cells treated with 60 µg/ml lindane. Compared to the control, the cell steamings were scanty in the pesticide treated cells. Further lindane treatment causes the formation of fewer and smaller aggregates, slugs and fruiting bodies. Morphogenesis was totally blocked in cells treated with 100 µg/ml lindane.

9403-137. Gopal Krishna, Ram MD, (Indl Toxicol Res Cent, Mahatma Gandhi Marg, PB No. 80, Lucknow 226001). **Carbofuran induced histopathological changes in certain tissues of fresh water fish Channa punctatus (Bloch.)** *Proc Acad Environ Bio* **3** (1) (1994), 43-47 [16 Ref].

Fresh water fish Channa punctatus exposed to (0.6 ppm) dose of carbofuran showed histopathological changes in liver, intestine and kidney. Liver showed extensive pyknosis in hepatocytes and dark stained specks of necrotic nuclei. Kidney of the exposed fish showed shrinkage of glomeruli along with swollen capsules. Renal tubules were widened and intestine showed detachment, rupture of villi and mucosal fold layer.

9403-138. Gulati Amita, Prakash Sant, Gupta SP (Cent Atmospheric Sci, Indian Inst Techno, Delhi 110016). **Genotoxicity testing for relative efficacy of selected pesticides on Allium cepa.** *J Environ Bio* **15** (2) (1994), 89-95 [10 Ref].

The genotoxic effects of the pesticides, monocrotophos and endosulphan, have been studied using root meristems of Allium cepa after 24 and 48th exposure to the test chemical. Monocrotophos treatment results in greater chromosomal break than endosulphan, with a reduction in mitotic index. Both chromosomal and mitotic abnormalities were encountered at all concentrations ranging from 0.2 to 5.0 ppm.

Reduction in staining and chromatid breaks with higher concentration suggested clastogenic action of these compounds.

9403-139. Gupta Ashok Kumar, Sharma Sanjeev Kumar (Dept Limnology Fisheries, Rajasthan Agricul Univ, Udaipur Campus, Udaipur 313001). **Bioaccumulation of zinc in *Cirrhinus mrigala* (Hamilton) fingerlings during short-term static bioassay.** *J Environ Bio*, **15** (3) (1994), 231 -237 [31 Ref].

In the present investigation, short-term toxicity and bioaccumulation of zinc ions were evaluated in an Indian major carp *Cirrhinus mrigala* fingerlings. The safe and highest and lowest median lethal concentrations i.e. 0.5134 and 1.826 (24th) and 1.633 (96th) mg Zn/l respectively were noted for the Fingerlings. The accumulation and retention of zinc were also investigated in select tissues during the period of 96h in static bioassay and after a period of 96h in normal water.

9403-140. Gupta Pratibha, Banerjee DK, Bhargava SK, Kaul Rajni, Ravishanker V (Dept Physio, Univ Coll Medl Sci, GTB Hosp, Delhi 110095). **Impaired lung-functions of iron foundry workers of east Delhi.** *Indian J Occupl Hlth*, **36** (3) (1993), 91-98 [19 Ref].

Forty nine foundry workers of East Delhi were studied for respiratory functions of X-ray chest in relation to occupational exposure to work place environment. The diminished pulmonary functions and abnormal findings of X ray chest evince a association between these results and the high concentration of SPM and trace metals to which these mixing unit workers were exposed.

9403-141. Hans RK, Farooq M, Gupta RC, Beg MU (Indl Toxic Res Cent, PB No 80, MG Marg, Lucknow 226001). **Dissipation and accumulation kinetics of endosulfan in soil and earthworm-*Pheretima posthuma*.** *J. Environ Bio* **15** (2) (1994), 127-133 [11 Ref].

Periodic dissipation and accumulation kinetics of endosulfan (at 1 ppm concentration) in soil and earthworms were studied by soil pot exposure method in controlled environment chamber in the laboratory. The extractable residue and half life of endosulfan in soil was found to be 92% and 15.8 days respectively. The daily uptake of endosulfan by earthworm from soil was 1503 ppb/day suggesting an increase of residue build up and cumulative effects.

9403-142. Hota AK, Pradhan AK, (Sch Life Sci, Sambalpur Univ, Jyotivihar 768019).

Mercuric chloride toxicib on a fresh water fish *Channa punctatus*: effect on liver phosphatases activity. *Pro Acad Environ Bio*, **3** (1)(1994), 87-91 [17 Ref].

Effect of exposure to sublethal concentra-tion of mercuric chloride (0.2 ppm) for 24, 48, 72, and 96 h has been investigated on liver phosphatase activity of an air breathing fish *Channa punctatus*. A significant increase in the phosphatase activity (both acid and alkaline) was observed. The activity also increases with the increase in time exposure. This was correlated to the lethargic behaviour of exposed fishes.

9403-143. Hussain Tanveer, Rastogi SK, (Dept Cardiac Surgery, Sanjay Gandhi PG Inst Medl Sci, PB 375, Raebareli Rd, Luck-now 226001). **Toxic effects of welding fumes: an overview.** *Indian J Occupl Hlth* **36** (4) (1993), 117-129 [37 Ref].

Welding is associated with a number of non-respiratory health hazards. Prominent among them are the effects of electricity, heat and electromagnetic radiation of several wavelengths. The aerosols and gases generated in welding processes are considered to be among the more harmful of the many exposures of welders. Welders may also experience respiratory illness as a result of the interaction between welding inhalation exposures and cigarette smoking.

9403-144. Iyer GK, (Medl Div, Bhaba Atom Res Cent, Trombay). **Long term effects of low doses of ionising radiation-facts and fallacies.** *Indian J Occupl Hlth.* **36** (3) (1993), 67-70 [5 Ref].

Health effects of low doses of ionising radiation have been a public concern. The public perception of these low effects is that it causes cancer and genetic effects. Enormous amount of work regarding this cancer has been done all over the world, on occupational workers exposed to low doses of ionising radiation and the results of these studies is that apart from any adverse effect on them they are showing the healthy worker effect. Epidemiological studies done on members of public staying near nuclea facilities also have shown that there JA is no health risk involved by staying near these facilities. Genetic effects have also shown negative results. These two aspects of health effects of low dose of radiation are discussed in detail.

9403-145. Joshi SN, Patil HS (Dept. Zoo, Karnataka Univ, Dharwad 580003).

Differential toxicity of four chromium salts to male skipper frog *Rana cyanophlyetis*. *Env Eco*, **12** (1) (1994), 36-38 [8 Ref].

The LC₅₀ values of four chromium salts for *Rana cyanophlyetis* were determined. K₂Cr₂O₇ was found to be highly toxic to frogs followed by CrO₃, Na₂Cr₂O₇ and K₂CrO₄. The 96 hour LC₅₀ of K₂Cr₂O₇, CrO₃, Na₂Cr₂O₇ and K₂CrO₄ were estimated to be 130, 135, 410 and 500 kg/liter respectively, suggesting the differential toxicity of the Cr salts to *R. cyanophlyetis*.

9403-146. Kalra RL, Singh Balwinder, Battu RS (Dept Entomo, Punjab Agril Univ, Ludhiana, Punjab). **Organochlorine pes-ticide residues in human milk in Punjab, India.** *Environ Polln*, **85** (2) (1994), 147-151 [22 Ref].

Human milk samples collected from areas having intensive cotton cultivation and sparse cotton cultivation in Punjab (India) were analysed for organochlorine insecticides. Both DDT and HCH were detected in almost all the samples analysed. The average levels of DDT and HCH residues in samples from cotton-growing areas were significantly higher than in those from areas where cotton is sparsely grown.

9403-147. Kashyap Rekha Iyer LR, Singh MM (Forensic Sci Lab, Meghaninagar, Ahmedabad). **Evaluation of daily dietary in take of dichlorodiphenyl-trichloroethane (DDT) and benzene hexachloride (BHC) in India.** *Arch Environ Hlth*, **49** (1) (1994), 63-66 [17 Ref].

Duplicate samples of the diet of vegetarian adults were analysed to estimate the residues of dichloro-diphenyl-trichloroethane (DDT) and benzene hexachloride (BHC). The total food consumed by an adult per day was collected and categorized as fatty food non-fatty food, water, and beverages. Fatty food was the main source of these chlorinated insecticides, and it contributed almost 50% of the total dietary intake.

9403-148. Kaskhedikar P, Singh RP (Dept Zoo, Govt Holkar Sci Coll, Indore 452001). **Effect of malathion exposure on the worm burden of mice during experimental *Hymenolepis nana* infection.** *J Environ Bio* **15** (3) (1994), 199-292 [5 Ref].

Swiss albino mice were experimentally infected with 500 viable ova of *Hymenolepis nana*. sublethal doses of malathion were administered to these mice during the different phases of infection. Worm burdens of malathion exposed mice were found to be remarkably increased. The results indicate the existence of relationship between the worm burden and dosage of malathion. These were found to be directly proportional to each other. The probable explanation of these observations were discussed.

9403-149. Khan Asif A, Haque N, Khan RR (Dept Zoo, Aligarh Muslim Univ, Aligarh). **Effect of malathion on *Daphnia magna* under laboratory conditions.** *Indian J Environ Hlth*, **35** (4) (1993), 333-337 [13 Ref]

Malathion is widely used in fishery management for the control of undesirable Fishes. It is a less stable organophosphate compound which not only influence the lipid metabolism but also inhibit lipase activity. The present work embodies observations on the acute and chronic toxicity tests of malathion on *Daphnia magna* an important fish food organism, sensitive to toxic substances and has been extensively used in toxicity testings.

9403-150. Khanna Santosh, Rao GS, Dogra RKS, Shukla LJ, Srivastava SN, Dhruv SP, Shanker Ravi (Indl Toxicol Res Cent, Lucknow, 226001). **Styrene induced pancreatic changes in rodents.** *Indian J Exptl Bio* **32** (1) (1994), 68-71 [33 Ref].

Subchronic oral exposure to styrene in rodents for 4 weeks resulted in moderate congestion of pancreatic lobules, focal inflammatory reactions around islets (in mice) and altered serum insulin level while blood glucose levels remained unaffected. Increased beta cell degranulation together with characteristic neof ormation of islets were predominantly seen in pancreas of guinea pigs.

9403-151. Kumar R, Srivastava PK, Srivastava SP* (*Indl Toxicol Res Cent, PB 80, MG Marg, Lucknow 226001). **Leaching of heavy metals (Cr, Fe and Ni) from stainless steel utensils in food simulants and food materials.** *Bull Environ Contam Toxicol*, **53** (2) (1994), 259-266 [15 Ref].

Paper describes the leaching of Fe, Cr, Ni in food simulants and food materials which have been in contact of stainless steel surfaces during the cooking and storing. Fe, Cr and Ni were found to leach out in alkaline (5% sodium carbonate) and acidic (5%

acetic acid) medium while none of these metals leached out in distilled water. The leaching of Fe, Cr and Ni was also observed in acidic and alkaline food simulants following the repeated extraction. The leaching of Fe, Cr and Ni was observed from the old as well as new utensils in acidic and alkaline food simulants.

9403-152. Lele DV, Rajgopal T (Hindustan Lever Ltd. Haji Bunder, Sewri, Bombay 400015). **Spirometric evaluation of NSD employees handling raw materials-an epidemiological study.** *Indian J Indl Med*, **40** (1) (1994), 20-26 [6 Ref].

The results of pulmonary function tests of 26 employees, including crutcher operators, raw material feeders and powder feeders from the NSD department of a Bombay factory were evaluated with the help of a computerised software. These were compared with data from controls after matching for confounding variables to determine whether working in NSD was deleterious to health. Clinical evaluation of these 26 subjects as well as the analysis of the pulmonary functions involving five key variables did not reveal any statistically significant difference from the findings of the controls.

9403-153. Madhavi B, Anand CS, Bharathi A, Polasa H (Dept Microbio, Osmania Univ, Hyderabad 500007). **Biotoxic effects of pesticides on symbiotic properties of Rhizobial sps.** *Bull Environ Contam Toxicol*, **52** (1) (1994), 87-94 [116 Ref].

Effect of fifteen commonly used pesticides on symbiotic properties of Rhizobium sps. have been studied. The susceptibility of the Rhizobial strain to each pesticide was variable with regard to the parameters examined. Out of the three cultures examined, the symbiotic properties of Rhizobium sp IC3342 were more susceptible to the pesticidal treatment. Further, fungicides and herbicides showed more adverse effects than the insecticides. Of all the pesticides tested DDT and Zineb were found to be least effective on the symbiotic properties of the three Rhizobium cultures.

9403-154. Mansoor Ahammad M (Indian Inst Techno, Environ Engng Lab, Dept Civil Engng, Kanpur 208016). **Indicators of human enteric viruses in water.** *Indian J Environ Prot* **13** (11) (1993), 836-839 [16 Ref].

The current bacteriological water quality standards in terms of coliform counts are clearly inadequate for testing virological quality of water. Several other organisms have been suggested as indicators of human enteric viruses in water. Paper reviews the

use of different classes of bacteriophages, enteroviruses and *Clostridium perfringens* as indicators for enteric viruses. The review indicates that F-specific bacteriophages show better indicator features.

9403-155. Mehta Pratik, Kadam AN, Gajbhiye SN, Desai BN (Natl Inst Oceanogr, Regl Cent, Seven Bungalows, Versova, Bombay 400061). **Petroleum hydrocarbon concentration in selected species of fish and prawn from northwest coast of India.** *Indian J Marine Sci*, **23** (2) (1994), 123-125 [7 Ref].

Concentration of petroleum hydrocarbons in six fish and prawn species sampled at 10 transects from Veraval to Ratnagiri were determined using alkali digestion and alumina column chromatography followed by fluorescence spectroscopy. The most abundant species *Johnius glaucus* and *Coilia dussumieri* showed comparatively higher levels of petroleum hydrocarbons than others. Samples from Bassein and Thana creeks as well as from Bassein and Bombay coastal stations revealed relatively high accumulations. Comparison of values with concentrations in water and sediment from corresponding locations was discussed.

9403-156. Misra Vipil, Bakra Prakash P (Environ Bio Lab, Dept Zoo, Univ Rajasthan, Jaipur 302014). **Organochlorine contaminants and avifauna of Mahala water reservoir, Jaipur, India.** (*The Sci Total Env*, **144** (1994), 145-151 122 Ref].

Residues of a, b and γ isomers of HCH p, p'-DDT and its metabolites p, p'-DDE were estimated by gas liquid chromatographic analysis in the internal body organs of a few resident and local migratory species in and around Mahala water reservoir, a wetland near Jaipur. Total HCH levels were high in ovary, liver and brain tissues of large pied wagtail, red wattled lapwing and flamingo compared with the respective tissues of black winged stilt and fantail snipe. More b-HCH and total HCH was found in tissues of the large pied wagtail and c-HCH in tissues of red wattled lapwing compared with other species. The major part of HCH isomers in brains of birds examined was accounted for by, b-HCH and in certain cases a-H CH.

9403-157. Mule MB, Lomte VS (Dept Zoo, Shivaji Univ, Kolhapur 416004 MS). **Molluscicide (copper sulphate) toxicity to freshwater gastropod, *Thiara tuberculata*.** *Bull Environ Sci*, **10** (1992), 7-10 [13 Ref].

Copper sulphate is used as molluscicide to control the gastropod population. Thus the lethal dose, safe concentration, median lethal concentration (LC₅₀) of copper sulphate were calculated to freshwater gas-tropod, *Thiara tuberculata*. The LC₅₀ values for 24, 48, 72 and 96 hours exposure were 12.7, 10.7, 8.6 and 5.4 ppm respectively, and 2.2 ppm was the safe concentration of CuSO₄.

9403-158. Mule MB, Lomte VS (Zoo Dept, Shivaji Univ, Kolhapur 416004). **Cyperkill (cypermethrin) toxicity to lipid metabolism in *Thiara tuberculata*.** *Proc Acad Environ Bio*, **3** (2) (1994), 131-134 [12 Ref].

A study on the response of lipid metabolism was carried out in freshwater gastropod *Thiara tuberculata* following Cyperkill (cypermethrin) treatment. It was observed that the biochemical composition of *T. tuberculata* was significantly altered. The lipid content of whole body, foot, digestive gland and mantle was increased in acute treatment. In chronic treatment the lipid content of foot and mantle was increased and decreased in digestive gland. The increased lipid content in tissue of treated snail may be for detoxification of pollutant stress.

9403-159. Mullick Suparna, Konar SK (Fisheries Lab, Dept Zoo, Kalyani Univ, Kalyani 741235). **Pollution of water by mixture of metals, detergent, petroleum product and pesticide and its impact on fish.** *Env Eco* **12** (1) (1994), 189-194 [13 Ref].

The disposal of mixture of metals, detergent, petroleum product was studied with a view to protect fishes in rivers and estuaries. Using plankton as indicator, concentrations of 3.13 to 12.525 ppm of the mixture of these toxicants were disposed into outdoor water to assess the impact of growth and reproduction of the fish reared and also on phytoplankton, zooplankton, bottom-dwelling organisms, and on physicochemical parameters of water. The stress of pollution did not alter the yield and fecundity of fish.

9403-160. Murugesan AG, Haniffa MA (Cent Environ Sci, Manonmaniam Sundaranagar Univ, Alwarkurichi 627412). **Influence of textile mill effluent on food utilisation of the freshwater fish *Macropodus cupanus* (Cuvier).** *Env Eco*, **12** (1) (1994), 195-198 [19 Ref].

Exposure to textile mill effluent altered the normal food utilisation of the fish, *Macropodus cupanus*. Rate of ingestion and absorption of food was elevated at all concentrations. Maximum conversion rate of 9.57 mg/g per day was found in the fish exposed to 15% effluent, compared to 6.37 mg/g per day in the control. Conversion efficiency was increased (14.32 to 20.62%) at high concentrations.

9403-161. Nagabhushanam M, Suhashini PB, Rao MR, Rao KJ (Dept Zoo, Sri Venkateswara Univ, Tirupati 517502). **Effect of heptachlor on certain aspects of carbohydrate metabolism in swiss albino mice.** *Bull Environ Contam Toxicol*, **52** (6) (1994), 905-911 [114 Ref].

An attempt is made to explore the possible impact heptachlor on carbohydrate metabolism in albino mice (Swiss albino). The results show a significant and gradual decrease in total carbohydrates and glycogen of liver, muscle and kidney of mice as a function of the exposure period. It is found that the changes were pronounced more in liver compared to muscle and kidney. Since liver is considered as metabolic centre where synthesis, transport and storage of carbohydrates occur and under stress the depletion of carbohydrates may be due to rapid utilization of energy to face the alteration caused by heptachlor.

9403-162. Pande Rima, Saksena DN (Sch Std Zoo, Jiwaji Univ, Gwalior 474 011). **The toxicity of copper sulphate to the 1k fingerlings of *Labeo rohita* (Hamilton).** *Bull Environ Sci*, **10** (1992), 23-27 [21 Ref].

The acute toxicity of copper sulphate to the Fingerlings of Indian major carp, *Labeo rohita* (Ham.) was determined by direct interpolation, log-interpolation, log-probit, probit, unweighted regression, Litchfield Wilcoxon and Dragstedt-Behrens methods. The 72 h-LC₅₀ and 96 h-LC₅₀ values were, found to be $0.7996 + 0.00035 \text{ mg l}^{-1}$ and $0.7330 + 0.0023 \text{ mg l}^{-1}$. The histopathological changes in the kidney and intestine were also observed under the influence of sub lethal concentration (0.0799 mg l^{-1}) of copper sulphate.

9403-163. Parmer Prabha G, Patel SK (Dept Life Sci, Bhavnagar Univ, Bhavnagar-364 002). **Effect of endosulfan on the behaviour of *Bolephthalmus dussumieri* (Cuv. Val).** *Proc Acad Environ Bio*, **3**(1) (1994), 65-68 [7 Ref].

The commercially important edible marine fish *BoleopAthalmus dussutnieri* was exposed to the lethal (0.015 and 0.020 mg/l) and sub-lethal (0.010 mg/l) of the organochlorine pesticide endosulfan. Behaviour of the fish manifests itself in rapid jerky movement, erratic swimming, increased opercular movement, struggle in breathing, sluggishness, paralytic symptoms and change in colourisation.

9403-164. Patri M, Naik BN (PG Dept Zoo Appl Res, Ravenshaw Coll, Cuttack-753 003). **Effect of flyash on trace element metabolism of albino rats.** *Proc Acad Environ Bio* **3**(2) (1994), 213-218 [11 Ref].

Concentration of manganese, copper and zinc in flyash treated albino rats have been investigated, in various tissues. The liver manganese, lung copper and pancreatic zinc concentration showed an elevation upto 38.20, 37.32 and 26.64% after 60 days treatment with flyash. The blood zinc level was insignificantly elevated upto 10.94% and blood copper level significantly ($p > 0.001$) changes having 65.63%, when compared with the control rats.

9403-165. Pant SC, Arora Usha, Sugendran K, Vijayaraghavan R, Pandey P (Defence Res Dev Estb, Tansen Rd, Gwalior-474 002). **Lung damage caused by single and repeated inhalation exposure to diisopropyl phosphorofluoridate in mice.** *Asian J Exptl Sci*, **6**(1&2) (1992), 34-37 [13 Ref].

Lung damage induced by single and repeated inhalation of diisopropyl phosphorofluoridate (DFP) aerosols, 25 mg/m³ for 30 min daily was investigated in mice. The compound caused progressive diffused interstitial thickening on 4th day. The damage in bronchiolar epithelial cells was maximum on 7th and 11th day post exposure. Furthermore, single and repeated inhalation exposure to DFP caused degeneration of parenchymal cells, inflammatory reaction and congestion.

9403-166. Pawar Kishore K (PG Dept Zoo, KTHM Coll, Nasik 422 002). **Toxic and teratogenic effects of fenitrothion, BHC and carbofuran on the embryonic developments of *Cyprinus carpio communis*.** *Env Eco* **12**(2) (1994), 284-287 [13 Ref].

The toxic and teratogenic effects of fenitrothion BHC and carbofuran on the developing embryos of *Cyprinus carpio communis* were investigated. Percentage

hatching and survival of hatching decreased with increasing concentrations of pesticides. Fenitrothion was found to be most toxic and teratogenic to the embryos than BHC and carbofuran. Abnormalities observed were curvature of body axis, poor body and eye pigmentation, blisters on body, enlargement of pericardial sac, circulatory failure retarded, loss of balance and abnormal behaviour.

9403-167. Qadri Yamin Hussain, Swamy AN, Rao JV (Toxico Unit, Bio Div, India Inst Cheml Toxico, Hyderabad 500 007). **Species differences in brain acetylcholinesterase response to monocrotophos in vitro.** *Ecotoxicol Environ Safety*, **28**(1) (1994), 91-92 [30 Ref].

The investigation was designed to determine if species related differences in the sensitivity of brain AChE to inhibition by monocrotophos (MCP) could contribute to the interspecies differences in toxicity. Brain AChE activity was significantly greater in fish followed by pigeon and rat. Although fish brain had significantly greater AChE activity, it was the least sensitive to MCP inhibition. These data suggest that the greater sensitivity of rodent brain AChE to inhibition by MCP may contribute to the greater toxicity of MCP in rodents than in birds and fishes.

9403-168. Rajgopal T (Hindustan Lever Ltd, Bombay). **Quantitative risk evaluation of LPG storage and handling-occupational health and safety aspects.** *Indian J Occupl Hlth*, **36**(3) (1993), 79-84 [4 Ref].

Study deals with the assessment of hazards associated with storage and handling of LPG cylinders. The study is an attempt to quantify and evaluate hazards to come out with recommendations and is an attempt to familiarise others planning to carry out.

9403-169. Rajput MR, Mohan Brij, Pal PB (Regi Labour Inst, Sarvoday Nagar, Kanpur 208 005). **Pesticides formulation and the occupational environment.** *Indian J Environ Prot*, **13**(11) (1993), 840-844 [5 Ref].

A survey on environmental conditions was conducted in 1987 in some of the representative pesticide formulation units to evaluate the levels of airborne chemical pollutants in the work environment. The findings of the study revealed that the concentration in some cases were quite high as compared to their respective limits. The

present communication emphasized on existing environmental hazards at workplaces in pesticide formulation units with the idea to suggest control measures to improve the environmental standards and industrial hygiene practices in these units.

9403-170. Rastogi SK, Hussain T, Mathur N, Pangtay BS, Kumar A (Epidemiology Div, Indl Toxico Res Cent, PB No. 80, Lucknow 226 001). **Peripheral airway abnormalities among saw mill workers.** *Indian J Occupl Hlth*, **36**(2) (1993), 55-66 [23 Ref].

The saw mill workers exposed to wood dusts for more than 10 years showed significantly greater reductions in the small airways function than those observed in the workers exposed for less than 10 years thereby indicating that occupational exposure to wood dusts caused peripheral airways abnormalities primarily of obstructive type. The industrial hygiene studies conducted in the saw mills showed that the prevailing total dust concentration was quite high than the TLV prescribed by ACGIH.

9403-171. Rastogi SK, Hussain T, Kumar A (Epidemiology Div, Indl Toxico Res Cent, PB No. 80, Lucknow 226 001). **A cross-sectional study of pulmonary function disorders among silver foil workers.** *Indian J Oecupl Hlth*, **36**(2) (1993), 41-48 [18 Ref].

A random sample of 33 male workers in the age group of 15 to 50 years engaged in the making of silver foils was subjected to lung function testing during an epidemiological health survey to assess the respiratory effects of occupational exposure to lead and its oxides. The findings obtained were compared with those observed in the control group (N=31) belonging to the same socio-economic status and ethnic group and were never exposed to dust of lead and its oxides in their work environment. The study showed that the silver foil workers who were exposed to the dust of lead and its oxides did not have any excess prevalence of pulmonary abnormalities in comparison to that seen in the unexposed controls.

9403- 172. Reddy Kanala Kodanda, Ramachandraiah Thota, Reddanna Pallu, Thyagaraju Kedam (Dept Phyl Anthro, SV Univ, Tirupati). **Serum lipid peroxides and lipids in urban and rural Indian men.** *Arch Environ Hlth*, **49**(2)- (1994), 123-127 [27 Ref].

Serum lipid peroxides, lipids, blood pressure, body mass index, and dietary intake in 190 urban men were compared with 190 age-matched rural men. Significantly

higher levels of lipid peroxides, serum cholesterol, low density lipoprotein cholesterol, and triglycerides were seen in urban men, compared with rural men. There were statistically significant correlations between lipid peroxides and serum cholesterol and triglycerides in the urban men. The marked elevation of lipid peroxides and lipids in urban men may be the result of urbanisation, including exposure to environmental pollutants.

9403-173. Reddy PM, Philip GH (Dept Zoo, Sri Krishnadevaraya Univ, Anantpur 515 003). **In vivo inhibition of AChE and ATPase activities in the tissues of freshwater fish, *Cyprinus carpio* exposed to technical grade cypermethrin.** *Bull Environ Contam Toxicol*, **52**(4) (1994), 619-626 [18 Ref].

Toxic impact of cypermethrin on AChE and ATPase activities in freshwater fish, *Cyprinus carpio* has been studied. The activity of AChE was inhibited with an elevation of AChE content in all the tissues, viz., gill, brain, liver and muscle at all periods of exposure to 20 µg/L of technical grade cypermethrin. Both Mg^{2+} and $Na^+ - K^+$ dependent ATPases were inhibited in all the tissues of fish exposed to cypermethrin. The results obtained in the present study indicate the possibility of disruption due to the effect of cypermethrin on passive movement of ions i.e., the permeability characteristics.

9403-174. Reddy PS, Bhagyalakshmi A (Sch Life Sci, Pondicherry Univ, Pondicherry 605 014). **Elimination of diurnal rhythm of respiration by methyl parathion in the crab, *Ozitelphusa senex senex* Fabricius.** *Bull Environ Contam Toxicol*, **53**(2) (1994), 192-197 [18 Ref].

Diurnal variations in oxygen consumption of the fresh water crab, *Ozitelphusa senex senex* and also the effect of methylparathion, on the variations in oxygen consumption have been studied. Oxygen uptake was high during the dark span in both the tissues and in whole bodies. The differences between light span and dark span values of oxygen uptake were statistically highly significant at $p < 0.001$. Methylparathion exposure decreased the respiratory rate of whole animal and of both tissues. Methylparathion exposure also disrupted the rhythm of respiration.

9403-175. Sahai S, Thakur Nutan (Dept Zoo, Dr. HS Gour Vishwavidyalaya, Sagar 470 003). **Changes in electrophoretic patterns on blood serum proteins on exposure**

to pesticides in the hill stream fish *Garra goryla gotyla* (Gray). *Prod Acad Environ Bio* 3(1) (1994), 143-148 [21 Ref].

The changes in electrophoretic patterns of blood serum proteins have been evaluated using a polyacrylamide gel electrophoresis method (PAGE) in *Garra* on exposure to sublethal concentrations of three different pesticides (BHC) ppm; malathion 1 ppm and carbaryl 2.5 ppm). Treated fishes show a marked reduction in the number of protein fractions. After 96 h of BHC exposure 5 fractions were observed. After 10 d and 15 d a new low mobility fraction appeared. With malathion treatment the number of fractions was reduced to 4. Two high mobility fractions appeared after 7 d of exposure. With carbaryl treatment also 4 fractions were observed.

9403-176. Samal UN (Environ Res Lab, PG Dept Zoo, GM Coll, Sambalpur 768 004). **Effect of fluoride pollutants on growth of certain freshwater fishes.** *Env Eco*, 12(1) (1994), 218-220 [12 Ref].

The effect of fluoride on growth of air breathing fishes in a pond of aluminium factory were studied. *Clarias batrachus* and *Heteropneustes fossilis* showed growth as compared to other species of fishes of the pond.

9403-177. Sastry KV, Sachdeva Sarita (Dept Bio Sci, MD Univ, Rohtak 124 001). **Effect of waterborne cadmium and copper on the blood of the fish *Channa punctatus*.** *Env Eco*, 12(2) (1994), 291-297 [40 Ref].

The effect of chronic exposure to sublethal concentration of cadmium (1.6 mg/liter) and copper (0.3 mg/liter) individually and in combination was observed on the blood of a fish *Channa punctatus*. Hemoglobin, hematocrit level and the erythrocyte count decreased following 15 and 30 days of exposure. Mean cell volume decreased significantly but increase was recorded after 15 days exposure of copper and cadmium +- copper. Significant increase in mean cell hemoglobin concentration was recorded after 30 days.

9403-178. Saxena DK, Singh Chitra, Murthy RC, Mathur Neeraj, Chandra Satya v (Neurotoxico Div, Indl Toxic Res Cent, Lucknow). **Blood and placenta lead levels in an Indian City: a preliminary report.** *Arch Environ Hlth*, 49(2) (1994), 106-110 [21 Ref]

A preliminary investigation was carried out in a hospital in the city of Lucknow, India, to provide information on the possible range of lead (Pb) exposure in pregnant women and fetuses, to correlate high Pb levels with various socio environmental factors, and to examine any possible association between reproductive outcome and Pb levels in this population. The results indicate that maternal blood lead levels were higher in those who experienced abnormal deliveries and in those who ate non-vegetarian diets or drank groundwater compared with the respective control groups.

9403-179. Selvanayagam M, Daniel Wesley S, Joseph Thatheyus A (Unit Environ Sci, PG Res Dept Zoo, Loyola Coll, Madras 600 034). **Acute toxicity of a synthetic detergents to four aquatic hemipterans.** *J Environ Bio*, **15**(2) (1994), 159-16-1 [7 Ref].

Aquatic hemipterans are water quality indicators and are potential bioagents of mosquito control. Paper evaluate the acute toxicity of the synthetic detergent 'Ponvandu' to the four aquatic hemipterans namely *Micronecta quadristrigata*, *Anisops bouvieri*, *Diplonychus indicus* and *Laccotrephes griseus*.

9403-180. Sharma Arvind, Sharma Madhu Sudan (Dept Zoo, Sukhadia Univ, Udaipur 313 001). **Toxic effect of zinc smelter effluent to some developmental stages of freshwater fish, *Cyprinus carpio* (Linnaeus).** *J Environ Bio* **15**(3) (1994), 221-229 [19 Ref].

Acute and chronic toxicity of zinc smelter effluent to some developmental stages of freshwater fish, *Cyprinus carpio* have been studied. Parameters for acute toxicity such as LC₅₀ values maximum acceptance toxicant concentration (MATC), threshold concentration and safe concentration were determined by using static bioassay method. Eggs of *C. carpio* were found to be more sensitive to zinc effluent as compared to higher developing stages. Eggs reared in 50% zinc effluent showed abnormal body structure.

9403-181. Sharma GD (Dept Zoo, PMB Gujarati Sci Coll, Indore 452 002). **A gas chromatographic analysis of BHC residues in certain tissues of a freshwater teleost *Channa punctatus* (Bloch).** *J Environ Bio*, **15**(3) (1994), 203-208 [5 Ref].

Residues of BHC isomers accumulated in the gills, intestine and liver of *Channa punctatus* (Bloch) were quantitatively estimated by Gas chromatograph (Packard 437-A).

The study revealed a high accumulation of BHC residues in the target tissue. The maximum concentration of residues were noted on 30 days of experiment.

9403-182. Shukla Nandita, Poddar RK, Moitra JK (Dept Chem, NE Hill Univ, Bijni Complex, Laitumukhrah, Shillong 793 003). **Fluoride level in human cataractous lenses.** *Indian J Environ Hlth*, **35**(4) (1993), 268-271 [14 Ref].

Among the water samples from Bhilai region 95 per cent exceeded the acceptable limit of 0.6 mg/L fluoride whereas in Shillong region fluoride was not detected in 90 per cent of the samples. The study revealed that Fluoride ingested through the environment for several years is accountable for its accumulation in the eye lens and may pose risk of lenticular opacity leading to cataract development.

9403-183. Shukla Satya Prakash, Ajith Kumar T, Tiwari Devendra Nath, Mishra Bhanu Prakash, Gupta Ghan Shyam (Cent Adv Std Bot, Fac Sci, Dept Appl Chem, Inst Techno, Banaras Hindu Univ, Varanasi 221 005). **Assessment of the effect of the toxicity of a textile dye on Nostoc muscorum ISU, a diazotrophic cyanobacterium.** *Environ Polln*, **84**(1) (1994), 23-25 [25 Ref].

The impact of graded concentrations of acid mordant Metomega Chrome Orange GL, a common dye used in woollen, carpet and textile industries, was studied on protein and pigment content and photosynthetic oxygen evolution in a diazotrophic cyanobacterium Nostoc muscorum. The lower concentration of 5 mg dm³ showed a negligible effect on protein and pigment content and photo-synthetic oxygen evolution, whereas at higher concentrations a drastic decrease in the above parameters was observed.

9403-184. Singh Alaknanda (PG Dept Zoo, Bhagalpur Univ, Bhagalpur 812 007). **Oxygen consumption and ventilation rate in Channa punctatus (Bloch) exposed to sublethal levels of mercuric chloride.** *Env Eco* **12**(2) (1994), 252-255 [11 Ref].

The effects of sublethal concentrations (0.1-0.7 ppm) of mercuric chloride on the oxygen consumption and ventilation rate in the fish Channa punctatus were studied at various exposure periods. After 24-hour acclimatization in different sublethal solutions of mercury, oxygen consumption rate increased significantly. On shortterm exposure oxygen consumption rate decreased significantly.

9403-185. Singh Binay Kumar, Singh Shivesh P (Dept Zoo, Govt PG Coll, Shahdol, MP). **Toxic effect of some inorganic salts on testes of fresh water fish *Danio equipinatus* (Ham).** *Proc Acad Environ Bio*, **3** (2) (1994), 241 -244 [7 Ref].

Present observations were made on testes of fresh water weed fish *Danio equipinatus* by treating the fish with 1.5 ppm copper sulphate, 16.2 ppm lead nitrate and 11.3 ppm zinc sulphate for thirty and sixty days. The results show that due to toxic effects of these pollutants the secretion of gonadotrophic hormone decreases which results in decrease in sperm atogenesis, pyknosis and hypertrophy in the stages of speratogenesis.

9403-186. Singhal KC (Dept Zoo, DN Coll, Meerut 250002). **Biochemical and enzymatic alterations due to chronic lead exposure in the freshwater catfish, *Heteropneustes fossilis*.** *J. Environ Bio*, **15** (3) (1994), 185-191 [22 Ref].

The effect of exposure to a sublethal concentration (6 µg/l) of lead nitrate on the levels of glucose and lactic acid in blood, glycogen and lactic acid contents of liver and muscles, and the activities of hexokinase, lactate dehydrogenase, pyruvate dehydrogenase and succinate dehydrogenase in liver, kidney, intestine, gills and muscles of a freshwater catfish. *Heteropneustes fossilis* has been studied at intervals of 60 and 120 days. Blood glucose and muscle glycogen levels remained below normal level after 60 days exposure. Lactic acid level of the blood, liver and muscles, and glycogen content of the liver increased at this stage. The activities of all the four enzymes in gills and pyruvate and succinate dehydrogenase activities in muscles decreased.

9403-187. Sivakami R, Premkishore G, Chandran MR (Dept Anim Sci, Sch Life Sci, Bharathidasan Univ, Tiruchirapally 620024). **Effect of chromium on the metabolism and biochemical composition of selected tissues in the freshwater catfish *Mystus vittatus*.** *Env Eco*, **12** (2) (1994), 259-266 [39 Ref].

The effect of the heavy metal chromium on the metabolism and biochemical composition of tissues like liver, kidney, gills and muscles of the fresh water catfish *Mystus vittatus* was investigated. The exposed fish showed an enhanced respiration for the first two days followed by a decrease, suggesting a stress induced phenomenon.

While the acutely exposed fish showed a maximum chromium concentration in the gill, in chronic exposure they had the highest chromium concentration in the liver.

2403-188. Sreenivas SS, Rana BC (Centl Tobacco Res Inst, Res Stn, Hunsur 571105). **Growth and response of Nostoc to atrazine.** *Env Eco*, **12** (1) (1994), 214-215 [8 Ref].

Paper deals with growth and metabolic response of Nostoc sp. to atrazine (2-chloro-4 (ethyl amino)-6 (isopropylamino)-Striazine). Experiments were carried out using 50% formulation in different dosages ranging from 0 to 5 ppm on active ingredient basis. The results indicated a sharp decline in pigment content. The herbicide being photosynthetic inhibitor effected pigment content causing steady decline in carbohydrate content. The increase in protein content is resulted due to greater utilisation of carbohydrates as the energy source.

9403-189. Sreenivasalu Reddy P, Bhagyalakshmi A (Sch Life Sci, Pondicherry Univ, Pondicherry 605014). **Modulation of protein metabolism in selected tissues of the crab, Oziotelphusa senex senex (Fabricius), under fenvalerate-induced stress.** *Ecotoxicol Environ Safety*, **27** (2) (1994), 214-219 [23 Ref].

Crabs, *Oziotelphusa senex senex* were exposed to sublethal concentration (0.2 ppm) of fenvalerate, and changes in the protein metabolism of hepatopancreas and muscle were investigated. The levels of total and soluble proteins were decreased, whereas the levels of the free amino acids and activity levels of protease, alanine transaminase, aspartate transaminase, and glutamate dehydrogenase were significantly increased in the tissues of crabs exposed to fenvalerate. The changes were more pronounced with an increase in the period of exposure.

9403- 190. Srivastava Arun K, Srivastava Anil K (Dept Zoo SMM Town PG Coll, Ballia 277001). **Effects of chlordecone on the gonads of freshwater catfish, Heteropneustes fossilis.** *Bull Environ Contam Toxicol*, **53** (2) (1994), 186-191 [15 Ref].

Paper deals with the histological changes in the gonads of a freshwater catfish *Heteropneustes fossilis* induced by chlordecone (CD) on acute, sub-acute and sub-lethal concentrations at different time intervals. Extensive damage in the testes was caused on exposure of fish, both acute as well as short and long term sub-acute to CD. Apparent alteration took place in the ovary during long term higher sub-acute (0.024 mg CD/L)

exposure. The ovarian histology was not affected during either the acute or sub-lethal concentrations at short and long terms exposures to CD.

9403-191. Thakur Nutan, Sahai S (Dept Zoo, Dr. H.S. Gour Vishwavidyalaya, Sagar 470003). **Effect of carbaryl on the differential leucocyte counts of Channa punctatus, Channa striatus and Garra gotyla gotyla (Gray).** *roc Acad Environ Bio*, **3** (1) (1994), 99-103 [10 Ref].

Both species of Channa are more tolerant to the pesticide, the sublethal concentration being 10 ppm and 12 ppm respectively. Garra is less tolerant and 2.5 ppm is sub-lethal concentration. Blood samples taken from treated fishes at intervals of 96 h, 7, 10, 15 and 30 days were studied and compared with untreated controls. Blood smears stained with Giemsa were observed.

9403-192. Varadaraj G, Jayasuria S, Subramanian MA (PG Res Dept Zoo, CN Coll, Erode 638004). **Toxic effect of tannery emuent on the biochemical constituents in different tissues of Pila globosa.** *Env Eco*, **12** (2) (1994), 303-307 [14 Ref].

Static bioassays reveal that the LC 50/96 hour of tannery effluent for fresh water snail Pila globosa was 70% of the effluent. The snails were reared in different sublethal concentrations of the effluent for 15 days. Various biochemical constituents (total free amino acids, total proteins, total free sugars, glycogen and lipids) in the liver, gills, mantle and foot of the effluent-treated snails were estimated. In all the tissues, the metabolites were found to decrease depending on the dose of the effluent and duration of the exposure period.

9403- 193. Vasudev V, Subramanya G, Krishnamurthy NB (Dept Std Zoo, Univ Mysore, Manasa Gangotri, Mysore 570006). **Dominant lethals induced by dithane M-45 in silkworm Bombyx mori.** *Environ Res*, **65** (1) (1994), 145-148 [14 Ref].

Dithane M-45, a ethylenebis (dithiocarbamate) fungicide widely used in agriculture, including moriculture and sericulture, was tested for its efficacy in inducing dominant lethals in Bombyx mori. The results have revealed that all of the concentrations could induce significant dominant lethals in a dose dependent manner compared to controls. The results are discussed in the light of precautionary measures in the use of Dithane M-45 in the sericulture industry.

9403-194. Venkaiah K, Saiyed HN, Sharma YK, Sadhu HG, Kashyap SK, (Natl Inst Occupl Hlth, Meghani Nagar, Ahmedabad). **Multiple logistic model to assess the non-occupational pneumoconiosis risk.** *Indian J Occupl Hlth*, **36** (4) (1993), 103-105 [10 Ref].

Recently multivariate logistic models are used in understanding occupational diseases such as pneumoconiosis. The multiple logistic model is used to explain in measuring and comparing non-occupational pneumoconicals risk. The probable causative variables are screened on the basis of contributed variability using logistic regression and its G 2 static. This model demonstrated that most of the variability is explained by dust level and followed by age.

9403-195. Verma Yogendra Ruparelia SG, Hargan MC, Venkaiah K, Kulkarni PK (Natl Inst Occupl Hlth, Aquatic Toxicol Lab, Meghani Nagar, Ahmedabad 380016). **Acute toxicib of azo dyes to waterflea *Daphnia magna*.** *Indian J Environ Prot* **13** (1) (1993), 804-807 [9 Ref].

Acute toxicity tests for azo-dyes, remazol green and golden yellow were carried out using *Daphnia magna*. For remazol green 24 hr LC₅₀ value was found to be 70.26 mg/l. Its 95% confidence interval ranged from 35.16-140.26. The 24 hr LC₅₀ value for golden yellow dye was 46.15 mg/l and its confidence interval ranged from 27.65-77.04. It is apparent from the results that golden yellow dye is more toxic to daphnids than remazol green.

9403- 196. Vijay Joseph K, Anil Kumar DM, Jayantha Rao K (Dept Zoo, Sri Venkateswara Univ, Tirupati 517502). **Certain metabolic changes in *Rana hexadactyla* exposed to aldrin.** *Env Eco*, **12** (1) (1994), 33-35 [11 Ref].

Sublethal toxicity of aldrin decreased the levels of carbohydrates, glycogen, pyruvate and increased lactate, lipid and cholesterol levels in the liver and muscle of *Rana hexadactyla*. The changes were consistent with aldrin intoxication as a function of time of exposure.

9403-197. Yadav Jagannath, Akela BP (Dept Zoo, Degree Coll, Supaul, Saharsa 852131). **Aldrin induced haematological changes in the common Indian cat-fish. *Clarias batrachus* (Linn).** *Comp Physio Eco*, **18** (4) (1993), 156-159 [12 Ref].

The median lethal concentration LC_{50} of aldrin for *Clarias batrachus* was recorded to be 3.5 ppm. Aldrin toxicity caused a gradual and highly significant ($P < 0.001$) decrease in haemoglobin concentration and Total Erythrocyte Count (TEC) in both the sexes of *Clarias batrachus* at 0.5 ppm, 1.0 ppm, 2.00 ppm and 3.0 ppm of aldrin concentrations. The decrease in the value of haemoglobin and TEC might be due to anaemia or disturbance in the haemopoietic organs or because of iron deficiency under toxic stress.

Wastes

9403-198. Agarwal MK, Singh L (Bio-techno Div, Defence Res Dev Estb, Tansen Rd, Gwalior 474002). **Aerobic degradation of nightsoil by psychrotrophic bacterial isolates of Antarctica.** *Indian J Environ Hlth*, **35** (4) (1993), 321-325 [11 Ref].

Hum an waste can be degraded at mesophilic and thermophilic temperatures, but very little appears to have been done on the degradation of nightsoil at low temperatures. Present study was undertaken to develop an efficient bacterial consortium which can degrade nightsoil at low temperatures.

9403-199. Ambrose T, Arunkumar L Cyril, Vincent S (PG Res Dept Zoo, Loyola Coll, Madras 600034). **Impact of tannery effluent on food utilization in the freshwater fish *Cirrhinus mrigala* (Ham).** *Env Eco* **12** (2) (1994), 416-418 [13 Ref].

Food utilization parameters in *Cirrhinus mrigala* was found to be significantly inversely related to sublethal concentrations of tannery effluent. Increase in concentration of the effluent elevated egestion. Control fish converted maximum of the assimilated food with 9.74 and 10.04% as gross and net production efficiencies which declined drastically to respective mean minimums of 1.28 and 1.45% at the highest sublethal test concentration of 15% 96-hour LC_{50} .

9403-200. Bahri UC, Bhutani PK, Jain CL (Shriram Inst Indl Res, Analyt Sci Div, 19 Univ Rd, Delhi 110007). **Determination of residual vinyl-chloride monomer (R-VCM) in poly vinyl chloride resin and fused plastics.** *Indian J Environ Prot*, **13** (12) (1993), 895-898 [8 Ref].

An accurate, precise and simple method has been developed using head space gas chromatographic technique for analysis of residual amount of vinyl chloride monomer (R-VCM) present in PVC resin and finished products. The analytical range for the method is 0.1 to 50 ppm. The detection limit is 0.05 ppm. The results are reproducible with standard deviation less than 1%.

9403-201. Bansal TK, Bajpai RK (Thapar Inst Engng Techno, Sch Basic Applied Sci, Patiala 147001). **Cost effectiveness of reverse osmosis process for treatment of chromium plating effluents.** *Indian J Environ Prot* **13** (11) (1993), 825-830 [18 Ref].

A case study has been made to evaluate the cost-benefit analysis of reverse osmosis (RO) process and to compare it with the conventional chemical precipitation method for treating chromium plating effluents having Cr^{6+} , Cr^{3+} and Fe^{3+} concentrations of 40D, 200 and 40 mg/l, respectively. The annual operating cost of RO process is Rs. 240,000 in comparison to Rs. 259,000 by conventional method. Further more, there is a net saving of Rs. 165,000 per year due to the recovery of plating chemical (chromic acid) for reuse in the plating bath by RO process where as there is no recovery by the conventional process. The pay back period of RO process is about 3 years.

9403-202. Barman SC, Lal MM (Environ Monit Div, Indl Toxic Res Cent, MG Marg, PB 80, Lucknow 226001). **Accumulation of heavy metals (Zn, Cu, Cd, & Pb) in soil and cultivated vegetables and weed grown in industrially polluted fields.** *J Environ Bio*, **15** (2) (1994), 107-115 [25 Ref].

The level of heavy metals in the cultivation fields adjacent to Durgapur Industrial Belt were found to be much higher than the background level. Bio-accumulation of these metals in different parts of the different plant species were found either, within or beyond the critical concentration and maximum localisation were found in the J edible parts followed by non-edible leaves and shoots. This study can be applied in selecting the plant species suitable for cultivation in fields having high levels of heavy metal contamination.

9403-203. Bhattacharyya KG, Sarma Nikhileswar (Gauhati Univ, Dept Chem, Guwahati 781014). **Using flyash to remove mercury (II) from aqueous solution.** *Indian J Environ Prot* **13** (12) (1993), 917-920 [8 Ref].

Flyash from a coal-fired boiler has been found to be an effective adsorbent for removal of mercury (II) from aqueous solution. The adsorption is dependent on the pH of the solution and the maximum removal of mercury was obtained at a pH of 4.0. The experiments were conducted using 3 variables, the pH of the solution, the concentration of the mercury (II) solution and the dose of the flyash. The results indicate the potentiality of flyash to be used as a scavenger for mercury and other heavy metal pollutants.

9403-204. Bodhankar N, Chatterjee B (Pt Ravishankar Shukla Univ, Raipur 492010, MP). **Pollution of limestone aquifer due to urban waste disposal around Raipur, Madhya Pradesh, India.** *Environ Geo*, **23** (3) (1994), 209-213 [4 Ref]

During the rainy season deterioration in the quality of water, supplied through dug wells and tube wells, near an abandoned limestone quarry is now being used as an urban waste disposal site. The transportation of pollutants from the quarry to the groundwater system was facilitated by karst features. Furthermore, four major sources- domestic waste disposal, water conservation structures, landfills, and water wells- contributing to pollution were identified. This case study is an attempt to provide an understanding of how the karst features facilitate groundwater contamination .

9403-205. Chona MK (Dept Forest Product Utilisation, Dr. Y S Parmar Univ Horticult Forestry, Naini (Solan), H P 173230). **Biological treatment study in soap factory effluents.** *Bull Life Sci*, **2** (1992), 53-55 [9 Ref].

The soap factory effluents get self-purified when kept in well lighted place, with the help of phyto and zoo-plankton. A pattern of succession of organism from bacteria to ciliates, flagellates, green algae, rotifers, diatoms was clearly observed in 50% dilution of waste waters. The BOD was reduced to 70 to 80% and DO raised from 0 to 4.6 mg/l in eight week study period.

9403-206. Dar Gh Hassan, Mishra MM (Sec Microbio, SK Univ Agril Sci Techno, Shalimar, Srinagar 191121, Kashmir). **Influence of cadmium on carbon and nitrogen mineralization in sewage sludge amended soils.** *Environ Polln*, **84** (3) (1994), 285-290 [25 Ref].

The effect of cadmium on C and N mineralization in sewage sludge amended and unamended sandy loam, loam and clay loam soils was studied during 2 months incubation at 3 ± 1 ° C. The sludge amendment caused 15-39% increase in microbial respiration, with the maximum C mineralisation in sandy loam and the minimum in loam soil. The addition of $10 \mu\text{Cd g}^{-1}$ soil had no remarkable effect on C and N mineralization and microbial biomass; whereas significant decreases in the above parameters were observed at 25 and $50 \mu\text{g Cd g}^{-1}$ soil, irrespective of the sludge addition.

9403-207. Dave SR (Dept Microbio, Univ Sch Sci, Gujarat Univ, Ahmedabad 380009). **Biosorption of heavy metals.** *Proc Acad Environ Bio*, **3** (1) (1994), 21-24 [10 Ref].

Bacterial cultures have been tested for cadmium, copper and mercury removal from solution. Pre-growth temperature and pH, composition of medium used for the cultivation of organisms, age of the culture, amount of metal present in the system and cell mass used were found to be influencing the bioremoval of metal ions. Under the presently achieved optimum conditions bacterial cell mass resulted in 60, 70 and 70% removal of mercury, cadmium and copper respectively with only 30 minutes of contact time.

9403-208. Dayal Gopal, Singh RP (Dept Chem, St. John's Coll, Agra 282002). **Heavy metal contents of municipal solid wastes in Agra, India.** *Polln Res*, **13** (1) (1994), 83-87 [11 Ref].

The heavy metal contents of solid wastes produced by Agra city inhabitants during 1989-90 are discussed. Industrial areas contribute the maximum amount of heavy metals to the total metal contents followed by dumping grounds. Various sources of heavy metals have been identified.

9403-209. Doshi GR, Joshi SN, Pillai KC (Hlth Phys Div, Bhabha Atom Res Cent, Bombay 400085). **Determination of ^{129}I in water and air samples near a reprocessing plant by neutron activation analysis.** *Water dir Soil Polln*, **73** (1-4) (1994), 121-129 [16 Ref].

The neutron activation analysis was used to determine ^{129}I in water and air samples collected in the neighbourhood of a reprocessing plant. The method involved pre-concentration of ^{129}I of AgI from water samples, separation of Ag^+ , followed by

distillation, loading on Dowex-I, irradiation and post irradiation purification steps. Filter air samples were wet oxidised followed by distillation and other chemical procedure steps as described for water samples. The concentration of ^{129}I in rain water and air samples ranged from 0.155×10^{-3} to $0.327 \times 10^{-3} \text{ BqL}^{-1}$ and 0.054×10^{-6} to $0.295 \times 10^{-6} \text{ Bq m}^{-3}$ respectively. The average concentration of ^{129}I obtained in these samples have been translated to dose rates to an individual and have been found to be insignificant.

9403-210. Eyini M, Jayakumar M, Pannirselvan S (Dept Bot, Vellalar Coll Women, Erode 638009). **Distillery effluent induced changes in the epicuticular wax deposits of *Eichhornia crassipes*.** *Indian J Eco*, **20** (1) (1994), 1-4 [7 Ref].

The phylloplanes of *Eichhornia crassipes* plants growing in a natural water source (control) and in distillery effluent were investigated with the help of scanning electron microscope. The epicuticular wax deposits showed clear disorganization in the plants grown in distillery effluent. The epicuticular waxes of both control and test plants showed the presence of fatty acids, OH-bdiketones, hydrocarbons, esters and ketones. The content of the leaf epicuticular wax was significantly lower in the effluent grown plants than in the control plants.

9403-211. Ganguli NK, Chanakya HN (Cent Application Sci Techno Rural Areas (ASTRA), Indian Inst Sci, Bangalore 560012). **Mushroom cultivation on spent biomass from biogas plants.** *Curr Sci* **66** (1) (1994), 70-74 [12 Ref].

Mushroom cultivation on spent biomass feedstocks from biogas plants is an attractive option to utilize the residual lignin and cellulose to create cash flow from the use of biogas plants and make their use and operation lucrative in villages. The cultivation of oyster mushroom, *Pleurotus flabellatus*, on spent biomass feedstock from biogas plants has been shown to be feasible in this study.

9403-212. Gnanamani A, Kasturi Bai R (Sch Energy Sci, Madurai Kamaraj Univ, Madurai 625021). **Carbon, nitrogen mineralization and physical, chemical properties of the soil treated with biodigested slurry.** *Polln Res*, **13**(1) (1994), 17-29 [35 Ref].

A laboratory study was carried out to determine the mineralization of carbon and nitrogen of anaerobically digested cowdung slurry in soil. A significant positive

correlation was seen between the mineralization and slurry levels. Physical, chemical and biological characters of the soil increased appreciably by both macro and micro nutrients and microbial population after 60 day incubation.

9403-213. Jallan Getta, Pandey GS (Dept Chem, Ravishankar Univ, Raipur 492010). **De-ionisation process of Pb²⁺ and Zn²⁺ ions in sewage treatment.** *J Environ Bio*, **15** (2) (1994), 83-88 [7 Ref].

The self-regulated process of de-ionisation of heavy metal ions such as Pb²⁺ in the domestic sewage sludge has been studied by equilibrating the sludge with respective metal ions, and determining their concentrations after specific intervals of time. While total elimination was observed in case of Pb²⁺ ions, a substantial decrease was found in case of Zn²⁺ ions.

9403-214. Jeevan Rao K, Shantaram MV (Dept Soil Sci Agricul Chem, Coll Agricul, AP Agricul Univ, Rajendranagar, Hyderabad-30). **Heavy metal pollution of agricultural soils due to application of garbage.** *Indian J Environ Hlth*, **36** (1) (1994), 31 -39 [24 Ref].

Certain physico-chemical micronutrient and heavy metal properties of soils affected by long term application of garbage in agricultural fields around Hyderabad, are presented. Total micronutrient analysis revealed that the mean Fe content decreased and Zn, Cu and Mn increased due to application of garbage over the years. Soils upto 30 cm depth were contaminated with heavy metals due to addition of garbage at all the sites as compared to control.

9403-215. Jeevan Rao K, Shantaram MV (Andhra Pradesh Agricul Univ, Dept Soil Sci Agricul Chem, Coll Agricul, Rajendranagar, Hyderabad 500 030). **Chemical composition of urban solid wastes of Hyderabad and their use in agriculture.** *Indian J Environ Pror* **13** (11) (1993), 813-816 [10 Ref].

Chemical characteristics of urban solid wastes generated in Hyderabad were studied. The wastes were alkaline, EC ranging from 130 to 500 µS/m and organic carbon content ranged from 3.4 to 6.3%. The COD ranged from 89 to 168 mg/ g. Cation exchange capacity varied from 50 to 151 Cmol (P+)/kg waste, Free CaCO₃ ranged from

5 to 10%. Organic matter ranged from 5.8 to 10.9%. The total nitrogen, phosphorus and potassium varied from 0.1 to 0.48, 0.54 to 0.84 and 0.19 to 0.45% respectively.

9403-216. Kannan N, Rajasekaran N, Vallinayagam P (Dept Chem (PG), ANJA (Coll (Autonomous), Sivakasi 626124). **Characterization of match industry effluents.** *Indian J Environ Hlth*, **35** (4) (1993), 301-307 [8 Ref].

Waste water samples from match industries in Sivakasi were collected and analysed for various water quality parameters. The values were very high and well above the permissible levels. The computed water quality index (WQI) values were also high indicating the highly polluted nature of these waste waters. The values of correlation coefficients for all possible correlations among water quality parameters were computed.

9403-217. Khatik SK, Dikshit PR, Bhadoria AKS (Dept Soil Sci Agril Chem, JN Krishi Vishwa Vidyalaya, Jabalpur). **Re-cycling of oxalic acid industry waste (as a source of sulphur) in comparison with inorganic and biofertilizer effected on yield and nutrition of gram (I).** *J Indl Polln Contl* **9** (2) (1993), 99-103 [15 Ref].

Green house pot experiment was conducted with increasing levels of oxalic acid industry waste (as a source of sulphur), with doses of nitrogen, phosphorus and Rhizobium culture. It was observed that application of these treatments positively enhanced the nitrogen, phosphorus and sulphur uptake as compared to control. On the other hand, effect of industry waste matter application on soil pH and electrical conductivity was found to be non-significant.

940-3-218. Mandaokar SS, Dharmadhikari DM, Dara SS* (*Chem Dept, VRCE, Nagpur 440011). **Retrieval of heavy metal ions from solution via ferritisation.** *Environ Polln*, **83**(3)(1994), 277-282 [22 Ref].

Paper summarises the result of the studies on retrieval of heavy metal ions in solution by ferritisation and its potential application in waste-water treatment. The optimum procedure for ferritisation of heavy metal ions in solution has been evolved with respect to pH, concentration of Fe^{2+} , rate and time of aeration and temperature. The recommended procedure consists of controlled aeration of the solution containing

heavy metal ions and ferrous ions at pH 9.5-10.5 at about 50°C, until the black, granular, magnetic ferrite separates out.

9403-219. Misra SG, Kumar Pawan (Univ Allahabad, Sheila Dhar Inst Soil Sci, Allahabad 211002). **Studies on minimizrng the toxic effect of sewage sludge.** *Indian J Environ Prot*, **13** (12) (1993), 925-928 [19 Ref].

Present study was carried out with a view to find out the effect of domestic sewage in Sheila Dhar Institute research farm on the growth and yield of vegetable leguminous crop fenugreek and find out the suitability of insoluble phosphate amendment for minimizing the toxic effect of heavy metals of sewage sludge.

9403-220. Namasivayam C, Kadirvelu K (Environ Chem Div, Dept Environ Sci, Bharathiar Univ, Coimbatore 641 046). **Coirpith, an agricultural waste byproduct, for the treatment of dyeing waste water.** *Bio-resource Techno*, **48** (1) (1994), 79-81 [19 Ref].

The characteristics of dyeing wastewater are shown. Treatment of dyeing industry wastewater was carried out using carbonised coirpith as adsorbent as a function of agitation time, adsorbent dosage and pH. The efficiency of the carbonised coirpith, a waste material from the coir industry, is comparable with commercial activated carbon.

9403-221. Narwal RP, Gupta AP, Singh Aroop, Karwasra SPS (Dept Soil Sci, CCS Haryana Agricl Univ, Hisar 125004). **Composition of some cib waste waters and their effect on soil characteristics.** *Ann Bio*, **9** (2) (1993), 239-245 [7 Ref].

The sewage water samples were collected from Faridabad, Ballabhgarh, Palwal, Gurgaon, Rohtak and Bahadurgarh cities of Haryana to study their chemical composition. Surface soil samples were also collected from the fields receiving these waters to assess the impact of sewage water on soil properties. Analysis of city waste waters revealed a wide variation in their composition which was in accordance with the type of industries present in the area.

9403-222. Pandya GH, Alone BZ (Natl Environ Engng Res Inst, Napur 440020). **Characterization of petroleum hydro carbons by micro-elemental analysis.** *Indian J Environ Hlth* **35** (4) (1993), 257-26i [4 Ref].

An attempt has been made using "microanalysis" technique to obtain compositional information of petroleum fractions such as petrol, diesel, kerosene and the crudes with small quantity of material. An isolation procedure using methylcyclohexane has been developed to extract the crudes from aqueous samples. The recovery has been in the range of 76-79 percent.

9403-223. Pervez Shamsh, Pandey GS (Sch Std Chem, Pt Ravishankar Shukla Univ, Raipur 492010). **Contamination of river water and sediments by thermal power ash pond discharge.** *Indian J Environ Hlth*, **36** (1) (1994), 8-12 [7 Ref].

Contamination of Hasdeo river water (India) due to effluents from a thermal power ash pond is discussed. Data show that toxic elements (Pb, Cu, Cd, Zn, Cr, Mn, Ni, As and Hi,) which were not detected earlier in river water, and sediments were found introduced to it as a result of the mergence of the ash pond effluents.

9403-224. Rajan MR, Paul Raj Samuel (Dept Natural Resources Waste Recycling, Sch Energy & Sci, Madurai Kamaraj Univ, Madurai 625021). **Sewage recycling through fish culture.** *Env Eco*, **12** (2) (1994), 247-251 [12 Ref].

The effect of different BOD loadings of sewage on fish culture, BOD and microbial reductions were carried out. The BOD reduction ranged from 85.6 to 96.5%. The average percentages reduction in total viable bacteria, coliforms, salmonella and fecal streptococci in different ponds were between 61.9 and 87.7, 89.1 and 98.1, 92.4 and 97.1 and 95.1 and 100, respectively. The silver carp *HypopAthalsnichthys molitrix* production was higher in all ponds irrespective of the quantum of primary production.

9403-225. Raman VK, Pandey RA, Handa BK, Bal AS (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Microbial desulfurization of lignite.** *J Environ Sci Hlth, A* **29** (1) (1994), 17-29 [13 Ref].

High sulfur containing lignite was investigated for the removal of sulfur content by bacterial cultures using shake flask experiments. Results indicate that 78 per-cent

removal of the total sulfur is possible by using 5 percent lignite slurry concentration within 18 days by mixed culture of Thiobacillus ferrooxidans and Thiobacillus thiooxidans. The results also show improvement in lignite quality as volatile matter and ash content are reduced during microbial desulfurization .

9403-226. Sarkar JP, Chaudhuri S (Dept Plant Patho, Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia, West Bengal). **Cellulose degradative ability of waste water fungi with reference to pollution of Hooghly river.** *Indian J Eco*, **20** (1) (1993), 5-8 [4 Ref].

Fungi isolated from waste water sources discharged to Hooghly river were screened for cellulose degradation and utilization abilities. Significant extracellular activity was pronounced among the fungi studied which might be useful in bioconversion and recycling of cellulosic waste matter.

9403-227. Saroha Ramesh Kr, Singh JP (Modi Distillery, Modinagar 201204, Dist Ghaziabad, U P). **Effect of inoculum size on growth and reduction in COD values during bacterial action of distillery waste treatment.** *J Indl Polln Contl*, **9** (2) (1993), 85-88 [20 Ref].

Bacterial growth is highly dependent on the amount of inoculum added. During studies on the treatment of distillery effluent by especially isolated and purified strains of bacteria, the effect of inoculum size on growth as well as on reduction in COD were investigated. It was found that inoculum size corresponding to a Klerit reading of 150 to 200 units produced the maximum increase in bacterial biomass, and maximum reduction in COD values.

9403-228. Sekaran G, Chitra K, Mariapan M (Centl Leather Res Inst, Dept Environ Techno, Adyar, Madras 600020). **Studies on characteristics and storage stability of soak liquor.** *Indian J Environ Prot*, **13** (12) (1993), 921-924 [9 Ref].

The salt laden soak wastewater contains in addition to sodium chloride, coagulable solids, dissolved solids, NH_4^+ , NO_2^- , NO_3^- , S^{2-} , SO_4^{2-} and non-filtrable micro organisms. Soak liquor undergoes biological reactions under anaerobic conditions resulting in changes in concentrations- of the dissolved solids. Degradation of dissolved

proteins in the soak liquor under two phases (aerobic and anaerobic) and consequent changes in the concentration of NO_2^- , NH_4^+ , SO_4^{2-} , S^{2-} and COD are discussed.

9403-229. Shanta S, Kaul SN, Jayshree V, Singh KK, Juwarkar A (Natl Environ Engng Res Inst, Nagpur 440020). **Studies related to support matrix for the fixed film fixed bed reactor.** *J Environ Sci Hlth. A* **29** (1) (1994), 149-170 [114 Ref].

Preliminary screening experiments using different media of various particle sizes and, attachment of pure culture of *Eichhornia coli* were studied. Later the studies were extended to volatile solid uptake also. The studies revealed that the activated carbon exhibiting 83.7% attachment of *E. coli* is the best support matrix followed by refractory 4Y bricks exhibiting 79.7% attachment. But refractory brick is preferred over carbon as it is cheaper and can be reused again and again after simple backwashing.

9403-230. Sharma VK, Patil RS (Indira Gandhi Inst Dev Res, Goregaon (E), Bombay 400 065). **Source apportionment of suspended particulate matter using a composite receptor model.** *Indian J Environ Hlth*, **35** (4) (1993), 272-281 [16 Ref].

The application of receptor model techniques viz. Chemical Mass Balance (CMB) and Factor Analysis Multiple Regression (FA MR) models for source apportionment of SPM indicated that neither of these techniques was satisfactory at highly polluted site which is prominently affected by the anthropogenic emissions. A new approach of Composite Receptor Model (CRM) using CMB and FA-MR together in an interactive-form was developed. The CRM approach showed distinct improvement in results compared to individual applications of FA-MR and CMB models.

9403-231. Singh BK, Misra NM, Rawat NS (Dept Appl Chem, Indian Sch Mines, Dhanbad 826004). **Sorption characteristics of phenols on flyash and impregnated fly ash.** *Indian J Environ Hlth*, **36** (1) (1994), 1-7 [12 Ref].

Batch shaking adsorption experiments were conducted to estimate potentiality of fly ash (FA) and impregnated fly ash (IFA) in removing phenols from aqueous solution. Efficiency of phenol removal varied from 9 to 46 percent. Impregnated fly ash (IFA) has shown better efficiency of phenol removal than fly ash (FA). It was observed that polar substituted phenols having less steric hindrance are better adsorbed than others.

9403-232. Singh Ranjana D, Rawat Narendra S (Dept Appl Chem, Indian Sch Mines, Dhanbad). **Adsorption and recovery of Zn (II) ions by flyash in aqueous media.** *Indian J Environ Hlth*, **35** (4) (1993), 262-267 [12 Ref].

Absorption technique using fly ash has been applied for the removal of Zn (II) from aqueous solutions as a function of concentration, pH, temperature and particle size. Initial rates of adsorption of Zn (II) increases progressively after the first thirty minutes and slowly approaches equilibrium. The percentage adsorption decreases to 36.8 percent after its treatment with EDTA. Intra-particle diffusion has been observed to be rate limiting step.

9403-233. Soman AM, Ramteke DS, Mogha CA (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Alkaline reduction and sulphide precipitation of Cr⁺⁵ to Cr⁺³.** *Indian J Environ Prot*, **13** (11) (1993), 808-812 [9 Ref].

Present investigation deals with the reduction and removal of Cr⁺⁶ as it is toxic. Sulphide precipitation and reduction using sodium sulphide and ferrous sulphate is employed at alkaline pH. Uni-variant approach is utilized varying one parameter at a time. The optimum alkaline pH is 8. Optimum doses of sodium sulphide and ferrous sulphate are in the ratio 1:3. The reaction is optimized at this ratio with pH 8.0, reaction time 30 min and stirring speed 25 rpm for the removal of 25 ppm of Cr⁺⁶.

9403-234. Srikanth R, Madhu Mohan Rao A (Dept Bot, Osmania Univ, Hyderabad 500 007). **Impact of distillery effluent on seed germination biomass and yield of black gram (Phaseolus mungo).** *J Indl Polln Contl*, **9** (2) (1993), 93-98 [3 Ref].

The impact of distillery effluent on the germination percentage, growth and yield of black gram were tested at varying concentrations of distillery effluent. The parameters chosen for study include germination percentage, root and shoot growth, biomass and yield of crop. The growth of a plant, biomass and yield were altered at higher concentrations of the effluent. However, at lower concentration (high dilution) proved to be beneficial in terms of growth, biomass and yield of the crop.

9403-235. Thangaraj A, Kulandaivelu G (Sch Biol Sci, Madurai Kamaraj University, Madurai 625 021). **Biological hydrogen photoproduction using dairy and sugarcane wastewaters.** *Bioresource Techno*, **48** (1) (1994), 9-12 [9 Ref].

Photoproduction of H₂ by the photo-synthetic bacterium, *Rhodospseudomonas*, and the cyanobacterium *Anacystis*, grown in the dairy and sugarcane waste waters was investigated. The growth and H₂ production capacity of these organisms were maximum in 50-60% concentrations of the industrial effluents. Both *Rhodospseudomonas* and *Anacystis* cells showed 70-90% growth in the effluents and they could produce as much as 50-60% H₂ when compared to those grown in the normal culture media.

9403-236. Unnithan RS, Murthy DVS, Sastry CA (Indian Inst Techno, Dept Cheml Engng, Madras 600 036). **Anaerobic treatment of wastewaters in fluidized bed-a review.** *Indian J Environ Prot*, **13** (11) (1993), 817-820 [29 Ref].

The experimental and modelling investigations besides the review articles spread over nearly a decade have been reviewed in this paper in the area of anaerobic treatment of wastewaters in fluidised and expanded beds.

9403-237. Velrajan T, Saseetharan MK. Seshadri S (Dept Civil Engng, Kumaraguru Coll Techno, Coimbatore, Tamil Nadu). **Modelling in zone settling for domestic activated sludge.** *Indian J Environ Hlth* **35** (4) (1993), 338-341 13 Ref].

Since the concentration at the inflow of SST from ASP confirmed to zone settling, settling studies on domestic activated sludge was conducted under zone settling and a mathematical model for surface area for secondary sedimentation tank was developed keeping initial suspended solids concentration and desired underflow concentrations as influencing parameters.

Forestry and Environment

9403-238. Ahmad Shahbaz (Forest Sch, Jagadapur, M.P.). **Public participation and rural development in South Chhindwara forest division, Chhindwara (Madhya Pradesh).** *Indian Forester*, **120** (7) (1994), 611-614.

The South Chhindwara Forest Division is pursuing the goal of Rural Development through public participation. If the tempo continues for a few years it is hoped that the approach to development given above will prove to be the best for the development of rural areas of the country. No heavy demands for funds, staff and

facilities, yet development is possible once there is a clear purpose and villagers come up to join hands.

9403-239. Awasthi Ajay K, Tripathi Ajita (Sch Environ Bio, APS Univ, Rewa 486003). **Human activity impact analysis: a case study on Mand Forest Reserve.** *Proc Acad Environ Bio.* **3** (2) (1994), 155-160 [8 Ref].

Present paper deals with human activity impact analysis on Mand Forest reserve. Sorenson's (1971) network method was applied for environmental impact analysis. The expected environmental impact score obtained was 1717.592. The value reveals that the various human activities identified in the present investigation are impacting the forest system and its environment negatively.

9403-240. Chandrasekar AS, Kamalakar SB, Nataraja S, Hosethi BB (Dept Zoo Bot, Sahyadri Sci Coll, Shimoga 577203). **Impact of population growth on forest in and around Bhadravathi area.** *Env. Eco,* **12** (2) (1994), 459-461 [6 Ref].

A demographic study was conducted in relation to forest environment of Bhadravathi, Shimoga and Tarikere Talukas covering an area of 1257.26 km² over a period of seven decades. The increased population enhanced the anthropogenic activities in the area resulting into the decline in forest cover. About 56.9% of the forest was degraded due to human activities during the last seven decades.

9403-241. Dhar Shuban Krishna (Office Conservator of Forest, Govt Haryana, 522, Sect 6, Panchkula, 134109, Dt Ambala). **Rehabilitation of degraded tropical forest watersheds with people's participation,** *Ambio,* **23** (3) (1994), 216-221 [13 Ref].

Land degradation has assumed alarming proportions in the foothills of northern India. The attitudes of the villagers, and of forests, changed with the adoption of a new conservation strategy. In the process, people have taken more responsibility for providing protection against grazing and illicit felling. The amelioration of soil, in terms of reduction of soil pH, organic matter build up and improvement in soil fertility, consequent upon vegetation-cover development, are Reflected in the data.

9403-242. Gupta Raj K, Rao DLN (Centl Soil Salinity Res Inst, Karnal 132001).

Potential of wastelands for sequestering carbon by reforestation. *Curr Sci* **66** (5) (1994), 378-380 [23 Ref].

Indian soils are largely carbon-depleted but can be brought back to their native carbon-carrying capacity by reforestation. The current stock of organic carbon in Indian soils (24.3 Pg) can be increased to 34.9 Pg, the difference representing the potential for sequestering additional carbon in soils. Reforestation of 35 m ha of wastelands with suitable tree and grass species can sequester 0.84 and 1.06 Pg of carbon in vegetation and soil respectively.

9403-243. Jose Shibu, Sreepathy A, Mohan Kumar B, Venugopal VK (Coll Forestry, Kerala Agricul Univ, Vellanikara, Thrissur 680654). **Structural floristic and edaphic attributes of the grassland-shola forests of Eravikulam in peninsular India.** *Forest Eco Manag*, **65** (2 & 3) (1994), 279-291 [28 Ref]. 0

Contrary to the widely held dogma that shola forest does not possess adequate regeneration potential, the present study reveals that under the forest cover, profuse regeneration of almost all of the overstorey species occur. However, regeneration characteristics were different along the margins and in open grasslands, possibly as a result of differences in ecological conditions.

9403-244. Joshi Mukesh (Dept Bot, Kumaun Univ, Nainital 263002). **Patterns of forest floor respiration in broadleaf and conifer forest ecosystems in parts of central Himalaya.** *Proc Indian Natl Sci Acad*, **B60** (1) (1994), 67-73 [23 Ref].

Carbon dioxide evolution rates from the floors of broadleaf and conifer forests were measured by an alkali absorption method. The rate of CO₂ evolution was highest during rainy season followed by summer season and lowest during winter season. The rate of CO₂ evolution was higher in broadleaf forests than in conifer forests.

9403-245. Lal Shyam (Office Conservator Forests, (HQ), Lucknow, UP). **Rehabilitation of open-cast coal mines in Singrauli region of Uttar Pradesh and Madhya Pradesh.** *Indian Forester*, **120** (5) (1994), 399-405.

Paper deals with planting of suitable tree species and their results for rehabilitation of open cast coal mines in Singrauli region of Uttar Pradesh and Madhya Pradesh. It is proposed to remove *Prosopis juliflora* having 5 m wide strips and replant the clear felled areas with tall plants of *Dalbergia sissoo*, *Albizia lebbek* and *Tectona grandis*.

9403-246. Mishra G (Soc Forestry Proj, Bhubaneshwar, Orissa). **The Budhikhamari model of participatory management of the forest ecosystem in Orissa.** *Indian Forester*, **120** (7) (1994), 597-601.

To save the forests from illicit removal of fuel, fodder, timber and minor forest products by near villagers, the Forest Department played a novel task. The villagers were motivated in active conservation of the forests. This new and successful model of participatory management has been adopted by 79 villages.

9403-247. Pathan R S (Office Conservator of Forests, Vadodara, Gujarat). **Potentials of community participation in sustainable forestry (India).** *Indian Forester*, **120** (7) (1994), 570-578 [7 Ref].

Participatory forest management initiated in India has a better chance of success, if it is in tune with socio-cultural needs of local communities. The programme, that began with restoration of forests on degraded sites, can further develop into joint management of natural resources in important water-sheds. Site specific and transparent techno-extension strategies would motivate communities in self governance towards sustainable development.

9403-248. Rajendran S (Inst Soc Eco Change, Bangalore, Karnataka). **Community participation in social forestry in Tamil Nadu: some critical issues.** *Indian Forester*, **120** (7) (1994), 630-635 [6 Ref].

Policy makers and planners have started advocating community participation for the effective implementation of development and welfare programs. As the people's participation bears positive impact on Social Forestry Program (SFP), the implementing authorities emphasized the greater role of community participation. Paper attempts to highlight the problems and prospects of community participation in SFP based on an extensive survey conducted in two districts of Tamil Nadu.

9403-249. Ramakrishna Rao N (Office Conservator Forests, Monit Evaluation Publicity Div, Hyderabad, Andhra Pradesh). **Farm forestry potential in Andhra Pradesh.** *Indian Forester*, **120** (7) (1994), 585-590 [10 Ref].

Large extent of marginal private lands occur in Andhra Pradesh. Together with field bunds/field perimeter, the farmlands offer a great potential for tree growing. Past experience in the State has shown that Farm Forestry is the only way to bring about self sufficiency in wood and wood products. The success of the programme largely depends on the extension and marketing support.

9403-250. Rawat J K, Hooda A K, Dange R P (Office Conservator Forests, Socl Forestry, Rohtak, Haryana). **A feedback on social forestry project from Ambala district (Haryana).** *Indian Forester*, **120** (7) (1994), 591 -596 [7 Ref].

An evaluation study of Farm Forestry and village woodlots plantations under Social Forestry project has been carried out in Ambala District in Haryana. It has been found that there is marked deviation from the stated objectives of the programme. The main reasons for this have been identified as low awareness among the villagers about the programme and non-involvement of the villagers and panchayats in the management of the village woodlots and non-consideration of wood market conditions. It is suggested that the villagers and panchayats should be involved in management of these plantations from the planning stage itself by evolving joint management plans, extension and publicity efforts should be strengthened.

9403-251. Sharma R A (Office the Principal Chief Conservator of Forests, Bhubaneshwar, Orissa). **Shifting cultivation dynamism in Orissa, India.** *Indian Forester*, **120** (4) (1994), 319-327 [7 Ref].

The age-old practice of shifting cultivation has become unviable, leading to the degraiiation of forests and tribal economy mainly due to the changes in socio-economic and agro-ecological parameters which sustained it. Land-based technologies such as labour-intensive agroforestry systems, providing basic needs and employment, may be implemented by using surplus labour and wasteland in order to control shifting cultivation.

9403-252. Visalakshi N (Salim Ali Sch Eco Environ Sci, Pondicherry Univ, Pondicherry 605 014). **Fine root dynamics in two tropical dry evergreen forests in southern India.** *J. Biosci*, **19** (1) (1994), 103-116 [44 Ref].

Seasonality in fine root standing crop and production was studied in two tropical dry evergreen forests viz., Marakkanam reserve forest (MRF) and Puthupet sacred grove (PSG) in the Coromandel coast of India. The live biomass fraction of fine roots in MRF ranged from 46 to 203 g m⁻² and in PSG it ranged from 141 to 359 g m⁻² during the study periods. The dead necromass fraction of fine roots ranged from 6 to 37 g m⁻² in MRF and from 12 to 66 g m⁻² in PSG. Fine root production peaked during December in both the forest sites.

9403-253. Visalakshi N (Salim Ali Sch Eco Environ Sci, Pondicherry Univ, Pondicherry 605014). **Litterfall, standing crop of litter and their nutrients in two tropical dry evergreen forests in India.** *Int J Eco Environ Sci*, **19** (3) (1993), 163-180 [75 Ref].

Litter production, standing crop of litter on the forest floor and its nutrients were quantified in two tropical dry evergreen forests. The study extended from February 1990 to December 1991 in Marakkanam reserve forest (MRF) and from August 1990 to December 1991 in Puthupet sacred grove (PSG). The periodicity of total litterfall as well as that of its different components, was noticeably different for the two forests. Leaves contributed most to the total litterfall (56 to 70% in MRF, 67.8% in PSG) followed by twigs, amorphous and reproductive materials. Litterfall was correlated with annual rainfall and ambient temperature.

9403-254. Williams AJ, Singh RB, Bhowmick AK, Singh AK, Banerjee SK (Dir Eco Rehabilitation, Trop Forest Res Inst, RFRC, Mandla Xd, Jabalpur 482021). **Suitability of different tree species for copper mine overburdens.** *Env Eco*, **12** (1) (1994), 116-118 [10 Ref].

A pot culture experiment taking 14 different NFT and non-NFT species was conducted in copper mine overburdens of Malanjkhanda MP to find out the suitability of the species for afforesting program in overburdens. On the basis of growth performance and biomass production, *Eucalyptus grandis* was the most promising species followed by *Gmelina arborea*, *E. casnaldulensis* and *E. tereticornis*.

Energy and Environment

9403-255. Alagasen P, Vanithapriya S (PG Dept Zoo, Yadava Coll, Madurai 625014). **Preliminary study on the biodigestion of millipede waste for biogas production.** *Bio Edn*, **9** (4) (1992), 299-300 [5 Ref].

The possible utilisation of the waste of household millipede pest, *Xenobolus carnifex* is an alternative feed stock with cowdung for biogas production was tried. The millipede waste was supplemented with cowdung in different ratios and anaerobically fermented in laboratory. The amount of gas production was maximum (322.4 cc/day) when 30 gms of millipede waste was added with cowdung.)

9403-256. Bhardwaj BB, Gupta SR (Dept Bot, Kurukshetra Univ, Kurukshetra 132119, Haryana). **Organic matter dynamics in a *Populus deltoids* agroforestry system.** *Int J Eco Environ Sci.* **19** (3) (1993), 187-195 [23 Ref].

Biomass accumulation and seasonal variations in litter fall and fine roots were studied in a 5-7 yr old *Populus deltoides* agroforestry system in Kurukshetra, India. Total annual litter fall was 3350 to 3208 kg ha⁻¹, of which 85% were the leaves. The maximum fine roots biomass coincided with the peak growth of trees in September (5154 to 6846 kg ha⁻¹). About 70 to 76% of fine roots were in the top 30 cm soil layer.

9403-257. Desai Manik, Patel Vikram, Madamwar Oatta* (*PG Dept Biosci, Sardar Patel Univ, Vallabh Vidyanagar 388120, Gujarat). **Effect of temperature and retention time on biomethanation of cheese whey-poultry waste-a cattle dung.** *Environ Polln*, **83** (3) (1994), 311-315 [14 Ref].

Various conditions, such as temperature, total solid content, cattle dung-poultry waste-cheese whey ratio, retention time and stirring, were optimized with an ultimate aim of improving anaerobic digestion. Maximum gas production with enriched methane content (62% CH₄) was found with a retention time of 10 days, having a loading rate of 6.0 g total solid litre of digester day at 40°C.

9403-258. Hossain Jami, Sinha Chandra Shekhar (Tata Energy Res Inst, 9, Jorbagh, New Delhi 110 003). **Limiting CO₂ emissions in the power sector of India-supply curves for wind and small hydro.** *Energy Policy* **21** (10) (1993), 1025-1033 [38 Ref].

The potential and the costs of windfarm and small hydro power generation as a means of offsetting CO₂ emissions in India is discussed. Both the absolute and the incremental supply cost curves for CO₂ offset are constructed. Of the two options, the use of wind electric generators in windfarm offers much higher potential for energy paths to reduce CO₂ emissions but the estimated costs are substantially higher than the costs of small hydro. Unlike windfarm power generation, some identified small hydro sites offer possibilities of a net negative incremental cost of offsetting CO₂ emissions.

9403-259. Maithani GP (Forest Dev Corp, Bhopal, MP). **Dimensions of fuelwood problems of UP hills and solutions thereof.** *Indian Forester* **120** (3) (1994), 202-209 [4 Ref].

U.P. Hill Region forests are fast degrading. Though this is causing many problems but fuelwood scarcity is most acute. In rural areas fuelwood demand is estimated to be about 3.5 million tonnes. In addition to plantations both inside and outside forestry, socioeconomic development and providing alternate sources of energy have been suggested. Efficient protection and management of the existing forests should be aimed at for increasing their productivity. Efficient and just distribution systems and participation of local people in creation and management of assets have been emphasised. Some tree and shrub species have been suggested for raising fuelwood crops both in the forests and agroecosystems.

9403-260. Rajendran S, Rathinavel S, Sundararajan KS (Dept Bot, Saraswathi Narayanan Coll, Madurai 625 022). **Utility value of sewage-sludge in bio-gas generation.** *Proc Acad Environ Bio*, **3** (1) (1994), 105-109 [12 Ref].

Sludge deposited during sewage treatment poses a great problem of disposal. It was proposed to utilise sludge along with cow dung in different proportions to generate bio-gas. The present paper discusses the utility value of sludge in bio-gas generation apart from studying chemical composition and fertilizing effect of left over slurry after digestion.

9403-261. Sharma SK, Misra IM, Sharma MP (Dept Cheml Engng, Univ Roorke, Roorke 247 667). **Biogas production from biomass residues.** *Indian J Rural Techno*, **5** (2) (1993), 57-67 [11 Ref].

Experiments were conducted to determine the potential of Parthenium hysterophorus -carrot grass (PR) and Calotropis gigantea -Aak (CG) as feedstocks for biogas production. The results have indicated that under controlled conditions of pH and temperature, a quantity of 441 and 458 litres biogas/kg TS could be produced from PR and CG respectively compared to cattle dung (CD), giving only 210 litres biogas/kg TS added.

9403-262. Singh R, Anand RC (Dept Mic-robio, CSS, Haryana Agricl Univ, Hissar 125 004). **Comparative performances of Indian small solid state and conventional anaerobic digesters.** *Bioresource Techno*, **47** (3) (1994), 235-238 [12 Ref].

Biogas production from a solid state digester (SSD) and conventional KVIC plants was compared. The biogas production from the SSD was 84% of that from conventional plants when the maximum and minimum ambient temperatures were 40.2 and 24.9°C. The relative performance dropped to 60% with a further rise in temperature. Similarly, there was a drastic decrease in gas production as the temperature fell below 15°C. There was no gas production in the winter months. The solid state digester could perform well even in winter if the direct effect of temperature on the digester could be avoided by modifying the design by developing an underground anaerobic digestion system equipped with a feeding device for solid waste.

9403-263. Srivastava AK (Indira Gandhi Natl Forest Acad, Dehra Dun). **Productivity and economics of some commercial important forest trees.** *Indian Forester*, **120** (1) (1994), 12-29 [5 Ref].

Acacia nilotica, Dalbergia sissoo and Casuarina equisetifolia, these fast growing species have been planted under irrigated conditions in energy plantations and afforestation schemes in Gujarat State. Biomass production and cost benefit have been described in this paper.

Plant and Pollution

9403-264. Aggarwal RK, Kumar Praveen, Harsh LN, Sharma BM (Centl Arid Zone Res Inst, Jodhpur, Rajasthan). **Effect of effluents of textile industry on the growth of tree species and soil properties in an arid environment.** *Indian Forester*, **120**(1) (1994), 40-47 [114 Ref].

Paper deals with utilisation of textile industrial effluents for irrigation in forest plantations and its effect on soil properties in arid land of Western Rajasthan. The results thus indicate that highly sodic textile effluents can be used for growing the tree species, and its deleterious effect on soil can be mitigated by addition of gypsum in soil.

9403-265. Anbazhagan M, Dipti CR, Sandhya KG, Bhagwat KA (Dept Bot, MS Univ Baroda, Baroda 390 002). **Response of wheat seedlings to acid rain.** *Indian Botl Contactor*, **10**(2) (1993), 43-46 [18 Ref].

Twenty-day old seedlings of three varieties of wheat (*Triticum aestivus* L), viz Junagadh 21, Lok 54 and Sonalika, were exposed to simulated acid rain with pH 5.8, 5.0 and 4.2 for five days. The third pH-condition reduced the fresh and dry weights of shoot system and leaf area. Chl-a and Chl-b got drastically reduced in Lok 54. Acid rain induced the lipid peroxidation in all the varieties, while the accumulation of water soluble SH compound was high in Sonalika and less in Lok 54, Junagadh 21 showed the increased in SH compounds only at pH 4.2.

9403-266. Chauhan Ugam Kumari (Sch Environ Bio, APS Univ, Rewa 486 003). **Effect of cement dust pollution on the leaf surface microorganisms.** *Proc Acad Environ Bio*, **3**(2) (1994), 207-211 [10 Ref].

Enormous amount of cement kiln dust is deposited on the leaves of plants and trees, present in the vicinity of the cement factory. The sedimentation rate was calculated as 2.430/m²/day. The cement dust affect the leaf surface microflora of the tree species the most. The numbers of fungi increased on dusted leaves, than that of clean leaves due to the commence of diseases on aerial parts, and also the number fluctuated seasonally.

9403-267. Deb Manas Kanti, Mishra Rajendra Kumar (Sch Std Chem, Pt Ravishallkar Shukla Univ, Raipur 492 010, MP). **Spec trophotometric determination of malathion in plants and vegetables.** *Polln Res*, **13**(1) (1994), 63-68 [11 Ref].

An indirect sensitive spectrophotometric procedure for the determination of malathion in plants and vegetables at trace amounts has been developed. The method involves the following 3 steps: first, the conversion of organic phosphorus, contained in the pesticide into inorganic one by acid treatment; secondly, the formation of yellow molybdosphosphorus heteropoly acid (MPA); and finally, the determination of back-stripped molybdenum from PMA with SCN and N, N'-diphenylbenzamidine. The method is sensitive and reproducible. The relative standard deviation of the method for ten replicate determinations is 1.6%.

9403-268. Denduluri S (Dept Bio, Memorial Univ Newfoundland, St. John's AIB 3X9, Canada). **Reduction of manganese accumulation by ethylenediamine tetraacetic acid and nitrilotriacetic acid in okra (*Abelmoschus esculentus* L.) grown in sewage-irrigated soil.** *Bull Environ Contam Toxicol*, **52**(3) (1994), 438-443 [14 Ref].

Paper deals with reduction of manganese accumulation by ethylenediamine tetraacetic acid (EDTA) and nitrilo triacetic acid (NTA) in Okra (*Abelmoschus esculentus* L.) grown in sewage-irrigated soil. The accumulation was highest in plant roots treated with 1000 mg/g manganese, and treatments of plants with either EDTA or NTA resulted in considerably lower levels. The application of chelating agents reduced significantly the uptake of manganese in roots, stems and leaves even at 500 and 1000 µg/g Mn exposure.

9403-269. Gangadhar HS, Gowda Andani, Kantharaju ML (Dept Soil Sci, Univ Agril Sci, GKVK Campus, Bangalore-560 065, Karnataka). **Influence of copper tailings on the yield and nutrients uptake of fodder maize.** *Polln Res*, **13**(1) (1994), 31-36 [12 Ref].

The pot culture experiment was conducted to study the effect of copper tailings on the yield and uptake of nutrients by fodder maize. The waste material significantly increased the yield of fodder maize. Analysis of maize shoots indicated substantial changes in the uptake of sulphur, copper and iron. These changes occurred in all the

treatments with the effect being dependent on the rate of application. The use of these waste materials in agricultural practices is being studied.

9403-270. Garg Poonam, Chandra Prakash (Aquatic Bot Lab, Natl Botl Res Inst, Lucknow 226 001). **The duckweed *Wolffia globosa* as an indicator of heavy metal pollution: sensitivity to Cr and Cd.** *Environ Monit Assess* **29**(1) (1994), 89-95 [24 Ref].

The potential of *Wolffia globosa*, a profusely occurring rootless duckweed, was evaluated as an indicator of metal pollution in the water bodies. The results show that the plants are sensitive to the variations in metal concentration and are capable of high metal enrichment at very low ambient concentration of the metals.

9403-271. Gupta AK, Mishra RM (Sch Environ Bio, APS Univ, Rewa MP 483 003). **Effect of lime kiln's air pollution on some plant species.** *Polln Res*, **13**(1j) (1994), 1-9 [14 Ref].

Effects of lime kiln's air pollutants on some plants of Maihar region have been assessed. Results indicate the decreasing trend of dust deposition (mg/cm^2) on plant leaf surface with increasing distances from the emission source, In all four compass directions. Leaf washing suspensions of polluted site differed significantly for the values of pH, %Ca, %K and %Na from control site. Considerable differences in visual foliar injuries like chlorosis and necrosis have been observed between the leaves of polluted and control plants.

9403-272. Kale SP, Raghu K* (Nuclear Agricul Univ, Bhabha Atom Res Cent, Bombay 400 085). **Fate of ^{14}C -nitrogen in soils.** *Bull Environ Contam Toxicol*, **53**(2) (1994), 298-302 [10 Ref]. .

Paper presents the degradation of nitrogen by flooding and green manure amendment under semitropical conditions. Green manure amendment decreased the persistence of nitrogen in moist soil. The extract-able activity decreased from 65.9% at 10 days to 54.1% at 30 days while bound activity also decreased from 30.6% to 7.0%. In flooded soil, green manure amendment decreased the extractable residues considerably at the end of 30 days.

9403-273. Karande SM, Ghanvat NA (PG Dept Bot, PVP Coll, Pravaranagar, Loni 413 713). **Effect of untreated effluents of Pravara pulp and paper mill and distillery on seed germination and early seedling growth in pigeon pea.** *Proc Acad Environ Bio*, **3**(2) (1994), 165-169 [11 Ref].

The studies on physico-chemical characteristics of the untreated effluents of Pravara pulp and paper mill and Pravara distillery and its effects on seed germination and early seedling growth in pigeon pea (T-21) were carried out. The untreated effluent of paper mill when employed as it is or diluted showed negligible or no adverse effect on overall seed germination and early seedling growth. However, the distillery effluent when employed as it is or diluted elicited the significant deleterious effect on seed germination and early seedling growth in pigeon pea (T-21). The adverse effect of distillery effluent may be ascribed to the higher pollution load estimated.

9403-274. Karunyal Samuel, Renuga G, Paliwal Kailash* (*Dept Plant Sci, Sch Biol Sci, Madurai Kamariaj Univ, Madurai 625 021). **Effect of tannery effluent on seed germination, leaf area, biomass and mineral content of some plants.** *Bioresource Techno* **47**(3) (1994), 215-218 [8 Ref].

Effects of tannery effluent (25, 50, 75 and 100%) have been studied on seed germination of *Oryza sativa*, *Acacia holosericea* and *Leucaena leucocephala*. Germination was inhibited by 25% and 50% and prevented by 75% and 100% of the tannery effluent. Leaf area and biomass of the tannery effluent treated plants (25%) showed an increase over the control. The effluent concentration at 75% and 100% (vol. by vol. in water) killed the plants and only 25% was found to be suitable for fertiliser use.

9403-275. Krishnamurthy R, Srinivas T, Bhagwat KA (Plant Physio Lab, Dept Bot, MS Univ Baroda, Baroda 390 002). **Effect of air pollution on some bund trees of the agricultural lands.** *J Environ Bio* **15**(2) (1994), 97-106 [22 Ref].

Streblus asper *Capparis spinosa* and *Zizyphus jujubawere* more prevalent on the agricultural lands that were exposed to mixed air pollutants from the Gujarat State Fertiliser Corporation (GSFC). Dimorphic leaves were smaller than in *S. asper*. The leaves facing the emission source were smaller than those on the opposite side. The

leaves also absorbed more sulphur, synthesizing more glutathione and amino acid, and maintaining a higher levels of sugar, phenols and ascorbic acid.

9403-276. Malarvizhi K, Usharani MV (Dept Environ Sci, Bharathiar Univ, Coim-batore 641 046). **Effect of sodium selenite on the cytological effects of methyl parathion in the root meristems of *Allium cepa*.** *J Environ Bio*, **15** (3) (1994), 193-198 [25 Ref].

The effect of sodium selenite (SS) on cytological effects of methyl parathion (MP) was studied in root meristems of *Allium cepa*. Two concentrations of SS and MP and their combined treatment were used to find out the effect on mitotic index and cytological observations. The observations showed a decrease in the mitotic index in all the treatment group except in the combined treatment of SS and MP. The aberrations induced by MP were reduced to a significant percentage by SS at the tested concentration.

9403-277. Nashikkar VJ, Chakrabarti T (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Catalase and peroxidase activity in plants-an indicator of heavy metal toxicity.** *Indian J Exptl Bio*, **32** (7) (1994), 520-521 [10 Ref].

The effects of application of subtoxic levels of heavy metals in the form of amended sludges on plants, catalase and peroxidase activities in fully mature fresh leaf homogenates at the most active growth stage of grain crops were studied. The results suggests that the activities of catalase and peroxidase can be taken as indicator of heavy metal pollution of soils and subsequent stress situation in plants.

9403-278. Om Hari, Singh Nepal, Arya Mayank S (Dept Chem, Hindu Coll, Moradabad 244 400). **Combined effect of wastes of distillery and sugar mill on seed germination, seedling growth and biomass of okra (*Abelmoschus esculentus* (L) Moench).** *J Environ Bio*, **15** (3) (1994), 171-175 [7 Ref].

Present study was undertaken to investigate the combined effect of effluent of distillery and sugar mill at different concentrations on seed germination, seedling growth and biomass of okra. Germination percentage, seedling growth and biomass increased upto 80% effluent concentration. Germination was completely inhibited in 100% effluent. Germination was noted in 75% effluent, but seedling did not survived. However, the

waste water of distillery and sugar mill may be used for irrigation after diluting the effluent to 75%.

9403-279. Pandey Dilip Kumar, Soni Prafulla (Forest Eco Env Div, Indian Coun Forestry Res Edn, P.O. New Forest, Dehra Dun 248 006, U.P.). **Distillery effluent-a potential resource for irrigating forest seed beds.** *Ambio*, **23** (4 & 5) (1994), 267-268 [12 Ref].

The effect of different concentrations of distillery effluent on germination of three multi useful tree species; *Acacia catechu*, *Dalbergia sissoo* and *Morus alba*, which grow abundantly under tropical and subtropical climatic conditions, were examined. Experimental findings indicate that the seeds of *A. catechu* were more resistant and more vigorous than *D. sissoo* and *M. alba*. An effluent concentration of 10% was more favourable for seed germination compared to ordinary water.

9403-280. Pandey Madhu, Srivastava HS (Dept Plant Sci, Fac Life Sci, Rohilkhand Univ, Bareilly 243 995). **Mercury accumulation and inhibition of nitrate reductase activity in maize seedlings.** *Indian J Environ Hlth*, **36** (1) (1994), 13-18 [17 Ref].

Zea mays L.cv. Ganga Safed-2 seedlings were raised with ½ strength Hoagland's solution containing 0.1, 1.0, 5.0 and 10 mM HgCl₂ for 12 days at 28± 2°C. The accumulation of mercury in leaves and roots increased with increasing external Hg²⁺ concentration. The in vivo nitrate reductase activity in both primary and secondary leaves decreased with increasing concentration of mercury in the medium and at 10mM Hg²⁺ no enzyme activity was detected.

9403-281. Pandey Vivek, Misra Jyoti, Singh SN, Singh Nandita, Yunus Mhd, Ahmedabad KJ (Environ Bot Lab, Natl Botl Res Inst, Lucknow 226 001). **Growth response of *Helianthus annuus* L. grown on flyash amended soil.** *J Environ Bio*, **15** (2) (1994), 117-125 [13 Ref].

Helianthus annuus L. were raised on the soils amended with flyash. Plants were sampled thrice at 20, 40, and 60-day plant age from the date of sowing. None of the treated plants showed any visible injury symptoms either of nutrient deficiency or toxicity. The addition of fly-ash to soils at all the three levels promoted the plant growth as evidenced by increased leaf area and phytomass of the treated plants as compared to

control plants. Root-shoot ratio was generally lower for all sets of treated plants than for untreated plants.

9403-282. Rosakutty PJ, Kumaraguru AK (Dept Bot, Holy Cross Coll, Nagercoil 629 004, Tamil Nadu). **Effect of metacid-50 on the biofertilizer, Azolla pinnata R. Br.** *Polln Res.* **13** (1) (1994), 45-52 [22 Ref].

Effect of Metacid-50 on *Azolla pinnata* was studied in two phases, LC₅₀ was found to be 18.4 ppm. Under high concentration from 12 ppm to 25 ppm the mortality rate increased with increase in concentration of Metacid-50. High concentration of the pesticide brought about a pronounced decrease in chlorophyll-content. Under low concentration upto 0.15 ppm this chemical was growth promotory as there was an enhanced biomass production and multiplication of *Azolla*.

9403-283. Sabu PM, Ghose AKM (Dept Biosci, Sardar Patel Univ, Vallabh Vidya-nagar 388 120). **Morphological variations of *Peristrophe bicalyculata* Nees (Acanthaceae) as induced by pollutants resulting from coal burning.** *Proc Acad Environ Biol*, **3** (1) (1994), 49-51 [9 Ref].

The growth variations to air pollution were studied in populations of *Peristrophe bicalyculata* (Acanthaceae), a common wasteland weed, which is widely used as a cattle fodder, growing about 0.5 km away from a thermal power plant complex. The noxious substances and gases emitting from the thermal power plant change the environmental conditions towards the worse and affect the vegetation in more than one way. The plant studied, shows significant reduction in overall plant growth, leaf number, floral organs and biomass.

9403-284. Sahoo BC, Das Asit K (Dept Agric Chem Soil Sci, Fac Agric, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur 741 252, Nadia, WB). **Effects of pesticides on changes in reducing sugar, starch and soluble protein during maturation of different varieties of wheat.** *Polln Res*, **13** (1) (1994), 37-43 [9 Ref].

Two pesticides, Phorate 10 G and Furdan 3 G were applied on different varieties of wheat. The quantity of reducing sugar, starch and total soluble protein in ears were determined at different intervals from panicle initiation to harvesting. In most cases, the application of pesticides enhanced the nutrient contents very slightly. Furdan 3 G raised

the content of reducing sugar, whereas Phorate 10 G promoted the production of starch and protein.

9403-285. Satyakala G, Jamil Kaiser (Bio Div, Indian Inst Cheml Techno, Hyderabad 500 007). **Response of Chloroplast-enzymes of Eichhornia crassipes to Cu and Cr.** *Indian Botl Contactor* **10** (2) (1993), 69-74 [19 Ref].

Accumulation of Cu and Cr in *Eichhornia crassipes* altered the oxygen metabolism of the chloroplast. A linear increase of these metals was observed in the plants with increasing metal concentration (10 to 50 mgL⁻¹) in the medium in which the plants were placed. The chlorophyll and protein contents were affected as a result of the bioaccumulation of these metals in leaves.

9403-286. Sen Asit K, Bhattacharyya Manisha (Dept Chem, Viswa-Bharati Univ, Santiniketan 731 235, West Bengal). **Studies on uptake and toxic effects of lead on *Salvinia natans*.** *Indian J Environ Hlth*, **35** (4) (1993), 308-320 [45 Ref].

The uptake of Pb (II) and toxic effects of the metal on some biochemical parameters in *Salvinia natans* L were studied. The plant took up maximum Pb (II) (more than 90%) within one day upto 10 µgmL⁻¹ of Pb (II). Accumulation of the metal occurred mainly in roots. The effect of other foreign ions on the uptake of Pb (II) of *Salvinia* was studied.

9403-287. Sen Asit K, Mondal Nitya G, Mandal Sudhendu (Dept Chem Bot, Viswa Bharati, Santiniketan 731 235). **Toxic effects of chromium (VI) on the plants *Salvinia natans* L.** *Env Eco*, **12** (2) (1994), 279-283 [21 Ref].

The uptake of Cr (VI) and toxic effects of the metal on some biochemical parameters in *Salvinia natans* L. were studied. The uptake of Cr (VI) by the plant gradually increased with increase in concentration of Cr (VI) in the culture medium. Maximum accumulation of the metal was noted within six days. Maximum removal (about 90%) of the metal was recorded below 5 µg/ml.

9403-288. Sharma AM, Turkar OR, Sharma YM, Dikshit PR (Dept Soil Sci Agricl Chem, JN Krishi Vishwa Vidyalyaya, Jabalpur 482 004 MP). **Effect of various levels of**

phosphorus and sulphur rich oxalic acid industrial pollutant on the yield and nutrition of paddy grown in vertisol. *J Indl Polln Contl*, **9** (2) (1993), 71-76 [8 Ref].

A pot experiment was conducted to evaluate the effect of various levels of phosphorus in combination with sulphur rich oxalic acid industrial pollutant on the yield and nutrition of paddy taking Jawahar-75 as a test crop. The results show that grain and straw yield of paddy increased due to the applied phosphorus and sulphur levels as compared to control. However, significant increase in straw yield was found upto the 40 ppm of P level (MCP) and 20 ppm of sulphur level (corresponding to the-1.25 g oxalic acid industrial pollutant).

9403-289. Sharma B, Singh OS, Khattria S (Dept Bot, Punjab Agricul Univ, Ludhiana 141004). **Effect of acid rain on pollen germination and pollen tube growth in groundnut (*Arachis hypogaea* L.).** *Indian J Eco*, **20** (2) (1993), 117-120 [5 Ref].

Experiments were conducted to study the effect of simulated acid rain (pH 2.5, 3.5 and 4.5) on pollen germination and pollen tube growth in *A.rachis hypogaea* L. in vivo and in vitro. Pollen germination and pollen tube growth were inhibited at all the pH levels, inhibition being more pronounced at pH 2.5.

9403-290. Sharma DC, Mehrotra SC (Bot Dept, Lucknow Univ, Lucknow 226007). **Chromium toxicity effects on wheat (*Triticum aestivum* L. CV HD 2204).** *Indian J Environ Hlth*, **35** (4) (1993), 330-332 [8 Ref].

The presence of chromium is significant in the tannery effluents which farmers often use to fulfil their irrigational requirements. The present investigation is aimed at studying the effect of chromium on wheat, for it is a major dietary crop for man, and the fodder used by cattle.

9403-291. Sharma DC, Pant RC (Dept Bot Lucknow Univ, Lucknow 226007). **Chromium uptake and its effect on certain plant nutrients in maize (*Zea mays* L.CV. Ganga 5).** *J Environ Sci Hlth*, **A 29** (5) (1994). 941-948 [11 Ref].

The effects of chromium at 0.05, 0.1, 0.25, 0.5 and 1.0 mM on iron, manganese, zinc and copper in maize (*Zea mays* L. CV. Ganga 5) were studied in controlled glass house conditions at ambient temperature after 56 days growth when plants started

showing vein-clearing and papery appearance in the leaves. No clear pattern of iron concentration and in general, the reductions in manganese, zinc and copper in response to chromiums supply were observed.

9403-292. Singh Minaxi, Singh Shivesh Pratap (Dept Zoo, Govt PG Coll, Satna, MP). **Some environmental studies on toxicity of manganese metal.** *Proc Acad Environ Bio*, **3** (1) (1994), 53-57 [6 Ref].

The *Allium cepa* was selected as experimental material. The cytological effects of 10^{-2} M, 10^{-3} M, 10^{-4} M, of manganese sulphate were observed and scored in terms of macroparameter, microparameter and as chromosomal abnormalities. The experiments concluded that the metal manganese ($MnSO_4$) is a severe root length and root number supressor, mild mitotic repressor and fairly strong inductor of chromosomal abnormalities like C-mitosis, chromosome bridge and clumping.

9403-293. Somashekar RK, Siddaramaiah (Dept Bot, Bangalore Univ, Bangalore 560056). **Effects of soaps and detergents factory effluents on soil and crop plants.** *J Indl Polln Contl*, **9** (2) (1993), 77-84 [30 Ref].

The physico-chemical characteristics of M/s. Karnataka Soaps and Detergents Limited. effluent were determined and its effect on soil and plants for six weeks were evaluated. The effluents were alkaline and their BOD and COD values were high. It contained 36.0 mg/L zinc and was deficient in nitrates and potassium. Following application of effluents to soil no appreciable change in the chemical composition of soil occurred. The effluents at higher concentrations effectively delayed and sup-pressed germination of seeds of *Pennisetum typhoides* and *Pisum sativom*.

9403-294. Sundararajan KS, Rathinavel S, Rajendran S (Dept Bot, Saraswathi Narayanan Coll, Madurai 625022). **Bio-chemical monitoring of sewage pollution.** *Proc Acad Environ Bio* **3** (1) (1994), 111-114 [17 Ref].

Responses in enzyme activity in plants exposed to sewage pollution vary with species. Variation in enzyme activity under such conditions can serve as a biochemical monitoring tool for pollution toxicity. Significant reduction was observed in nitrate reductase (NR) activity in all species examined that were subjected to sewage stress. Status of this enzyme can be best used as a sewage pollution indicator.

9403-295. Swain Sabita (Dept Bot, Ruparel Coll, Bombay 400032). **Effect of autoexhaust pollution at western express highway near National Park, Boriveli (East), Bombay on the leaf anatomy of some weeds (1 Harvest)-I.** *J Mendel*, **11** (1 & 2) (1994) 61-63 [11 Ref].

Auto-exhaust pollution was evaluated on, the leaf anatomy of *Malachra capitata*, *Cassia tora*, and *Sida cordifolia*. The intensity of pollution was studied by using the parameters such as thickness of leaf, thick-ness of upper and lower epidermis, thick-ness of pallisade tissue, thickness of spongy tissue and P/S ratio. All the parameters of leaf anatomy were inhibited to a great extent by the auto-exhaust pollution at Western express highway near National Park Borivili (East), Bombay India.

9403-296. Taghavi S Manuchehr, Vora AB (Bot Dept, Univ Sch Sci, Gujarat Univ, Ahmedabad 380009). **Effect of industrial effluent on germination and growth development of guar seed (var. PNB).** *J Environ Bio*, **15** (3) (1994), 209-212 [8 Ref].

The effects of effluent from IFFCO on extension of shoot/root growth along with biochemical estimation showed that although major element like Na, Ca, Mg were high in concentration besides of slight basic nature of effluent, its higher concentration was not harmful. Elongation of growth was directly proportional to the concentration of effluent. Higher concentration of effluent was detrimental to chlorophyll.

9403-297. Tiwari S, Bansal S, Rai S (Govt PG Girls Coll, Shivaji Nagar, Bhopal 462016). **Expected performance indices of some planted trees of Bhopal.** *Indian J Environ Hlth*, **35** (4) (1993), 282-287 [15 Ref].

Few planted species were analysed at various phyto-socio-economic as well as a few biochemical levels for certain vital parameters like photosynthetic pigments, relative water content, leaf extract pH, and ascorbic acid contents. These plants have been graded on an arbitrary scale of 0-7-on the basis of their Expected Performance Index which is an expression of the total characterization of plant species with reference to its behaviour under polluted environment.

9403-298. Trivedi ML, Singh RS, Kumar Mandeep (Dept Biotechno, Punjabi Univ, Patiala 147002 Punjab). **Impact of thermal power station emissions on chlorophyll**

and protein contents in *Coreopsis lanceolata* L. *New Botanist*, **20** (1-4) (1993), 151-158 [28 Ref].

Studies were made to assess the effect of thermal power station emissions on chlorophyll and protein contents in *Coreopsis lanceolata* L. Plants grown in the area of thermal power station were stunted in growth and possessed various visible injury symptoms. A significant reduction in total chlorophyll was observed at all the growth stages except at 30 days stage, where the reduction was almost negligible. But for the 30 days stage where only chlorophyll a is marginally reduced, at all other stages the reduction in chlorophyll a and chlorophyll b was almost equal. However, reduction in protein contents was recorded at all the growth stages in plants of polluted locality.

9403-299. Vijayregan P (Div Environ Sci, Dept Bot, Annamalai Univ, Annmalainagar 608002). **Effects of nickel on seedling growth of blackgram and greengram.** *Indian Botl Contactor*, **10** (1) (1993), 39-41 [9 Ref].

Seeds of four cultivars each of blackgram and greengram were treated with 0-20 mg Ni l⁻¹. Reduction in root and shoot length by nickel treatment exhibited cultivar-specific differences. Blackgram cultivars ADT-4 and ADT-5 were highly sensitive to nickel treatment as compared to AB-1903 and AST-3. The sensitivity to nickel in greengram cultivars was the least in AG-2160, intermediate in ADT-2 and ADT-3 and the highest in KM-2.