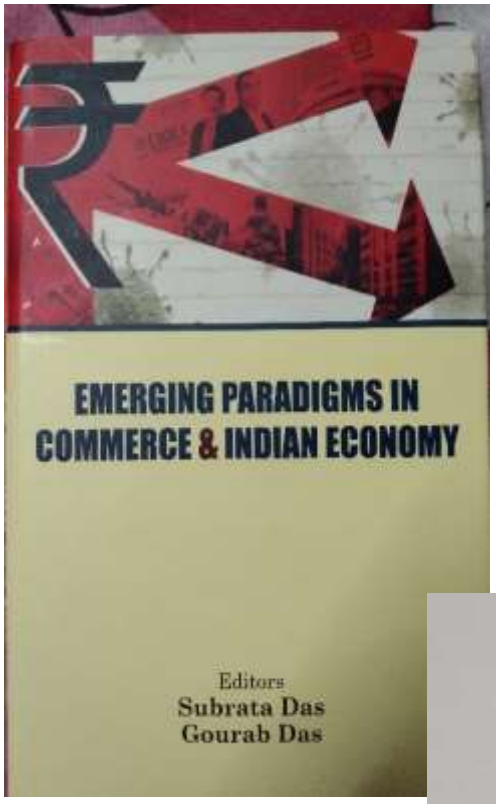
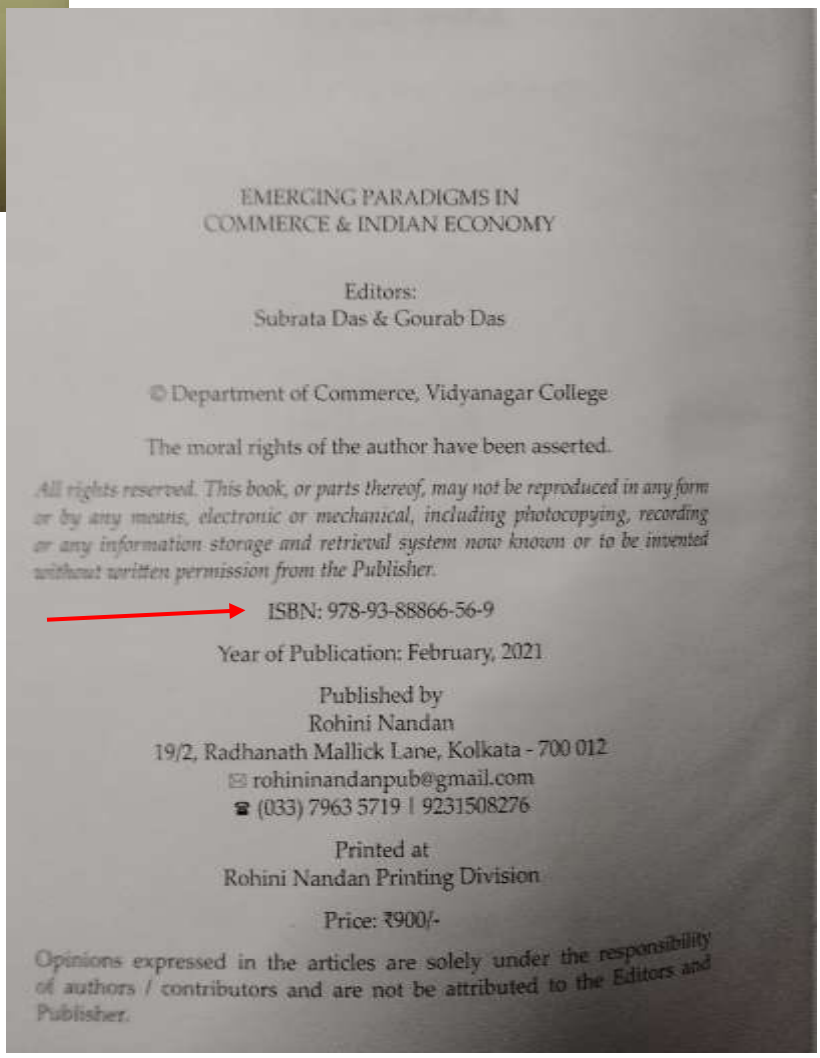
3.2.2 . Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during the year

1. **Neeloy Gupta. Relevant factors for difference in magnitude of income loss in lockdown: A study on residents of North Kolkata, West Bengal using Principal Component analysis. Published in Emerging Paradigms in Commerce and Indian Economy. 2021**

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Relevant Factors for Difference in Magnitude of Income Loss in Lockdown: A Study on Residents of North Kolkata, West Bengal using Principal Component Analysis

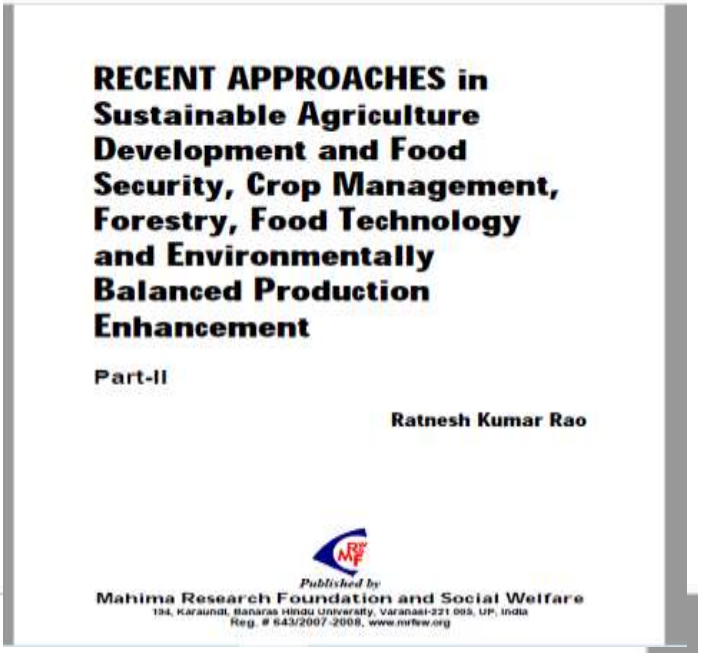
Neeloy Gupta*

ABSTRACT

In the year of 2020, the Indian economy has been hit by unprecedented Covid pandemic & lockdown. Since the lockdown million of formal & informal workers have experienced a huge loss in income in almost all the states in India including the state of West Bengal. The most interesting fact is that majority of the people experienced salary or earning deductions but the magnitude of their income loss were not the same. The present study has used Principal Component Analysis (PCA) to group the factors, causing the difference in magnitude of drop in their income in the month of April- May, 2020. The present paper developed the analysis based on the data of the residents of North Kolkata, West Bengal. The study initially identified 11 quantitative & qualitative variables which are account for the difference in earnings deduction and using PCA, the 4 components have been extracted. Lastly, after checking internal consistency of the relevant components, to reduce the number of variables, only 5 variables from the component-1 have been considered.

State Aided College Teacher, Category-I, Department of Economics, City College of Commerce & Business Administration, Kolkata & Faculty of Economics, T.H.K Jain College, Kolkata & Ph.D Research Scholar, University of Kalyani, Nadia, W. Bengal

2. **Anamika Ghatak, Suchismita Das, Shonima Talapatra Ghosh. Bioremediation: A Prospective Tool for Alleviating Environmental Pollution. Published in RECENT APPROACHES in Sustainable Agriculture Development and Food Security, Crop Management, Forestry, Food Technology and Environmentally Balanced Production Enhancement. 2021.**



BIOREMEDIATION: A PROSPECTIVE TOOL FOR ALLEVIATING ENVIRONMENTAL POLLUTION

Anamika Ghatak, Suchismita Das and Shonima Talapatra Ghosh

Department of Microbiology, Tara Devi Harakh Chand Kankaria Jain College, 6, Ram Gopal Ghosh Road, Cossipore, Kolkata 700 002, India. E-mail: shonima_talapatra@yahoo.com, Corresponding Author: Shonima Talapatra Ghosh

The last century has evidenced extreme technological advancement in the field of agriculture, textile, food, healthcare, chemical industries, electronic and various other sectors. All these industries have evolved in various aspects to satisfy basic needs of growing civilization; but in doing so they create pressure on our environment unlawfully. Unsafe waste disposal practices by all these industries serve as potential source of xenobiotic compounds (Pandey *et al*., 2007). Anthropogenic activities also introduce various hazardous compounds into the natural resources like soil and water (Fig. 1). These pollutants are thought to have deleterious impact on indigenous microflora of soil and water and are also responsible for causing severe health hazards in humans (Dzionek *et al*., 2016). Most of these harmful chemicals are non-biodegradable and their residues remain in the environment for an indefinite time. Bioaccumulation of these toxic substances in plants and animals affects their growth and metabolism adversely. Humans are also exposed to these toxicants due to consumption of contaminated foodstuffs or through inhalation or dermal penetration (Kumar and Bharadvaja, 2020) (Fig. 2). As a consequence we have witnessed an increased rate of neurological, hormonal, cardiovascular and reproductive disorders in last few decades (Tiwari *et al*., 2012). The increased risk of cancer in humans often is associated with continuous exposure to these mutagenic and carcinogenic substances (Singh and Michael, 2009). The current century therefore demands a cost-effective, eco-friendly and practical process for degradation of toxic wastes and their removal from environment.

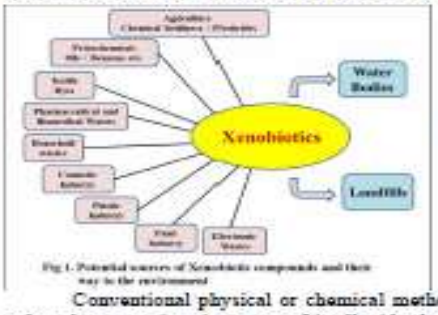


Fig 1. Potential sources of Xenobiotic compounds and their way to the environment

Fig2: Effect of Xenobiotic compounds on human health

Conventional physical or chemical methods available for treatment of wastes are expensive and at the same time is not eco-friendly (Azubuike *et al*., 2016). Bioremediation is the process of transformation of toxic chemicals into non-toxic or less-toxic forms by living organisms usually bacteria, fungi, yeast and plants (Fig. 3). Many indigenous microorganisms and plants present in polluted environment secrete enzymes which can detoxify harmful pollutants and thus they have been proved to be potential candidates for restoration of quality of our natural environment (Verma and Jaiswal, 2016). The basic bioremediation methods mostly include bio-stimulation, attenuation, augmentation, venting and piles. However; the present review is aimed at providing comprehensive idea about bioremediation of some toxic environmental contaminants to establish the role of living organisms in the management of environmental pollution.

1. Bioremediation of Heavy Metals: The metabolic activities of plants and animals recruit various enzymes which require metal ions for their activities; but their excess accumulation may interfere with their normal physiological functions. The definition of 'heavy metal' has become a point of argument for many. Conventionally, the high atomic weight or density is indicative of the term "heavy metal"; on a second thought, heavy metals are defined as metals or metalloids which are toxic to the environment. Most commonly occurring heavy metals which have a density of more than 5gm/cm^3

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