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2019-20

3.3.1 Number of research papers published per teacher in the Journals notified on UGC website during the last five years

S.n.	Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	SSN number	Link to the recognition in UGC enlistment of the Journal /Digital		
							Link to website of the Journal	Link to article / paper / abstract of the article	Is it listed in UGC Care list/Scopus/Web of Science/other, mention
1	Odered weak alpha contractions in cone metric spaces over banach algebras and fixed point theorms	Dr.S.K.Malhotra	Mathematics	Advances in the theory of nonlinear analysis and its applications	2019-20	2587-2648	https://dergipark.org.tr/en/pub/atnaa	https://dergipark.org.tr/tr/download/article-file/746068	Scopus
2	A generalization of nadler theorem in cone b-metric spaces over banach algebras	Dr.S.K.Malhotra	Mathematics	communications in optimization theory	2019-20	2051-2953	http://cot.mathres.org/	http://cot.mathres.org/issues/COT201910.pdf	Other
3	Fixed point theorem for three valued T-Zamferescu mapping in cone metric spaces	Dr.S.K.Malhotra	Mathematics	IJEDR	2019-20	2348-1269	https://ijedr.org/	https://www.ijedr.org/papers/IJEDR1904083.pdf	OTHER

4	A fixed point theorem to the relation between normal maps to weakly zamfirescu maps in the weak concept	Dr.S.K.Malhotra	Mathematics	JETIR	2019-20	2349-5162	https://jetir.org/?gclid=CjwKCAjwh-CVBhB8EiwAjFEPGQPL_kMGrNG35WoKPTo0sM4QV28COhKaBvoqBEShqf16oij-	https://www.jetir.org/papers/JETIR1908141.pdf	OTHER
5	Fixed point theorem for T-Zamfirescu mapping on cone metric spaces	Dr.S.K.Malhotra	Mathematics	IJEDR	2019-20	2321-9939	https://ijedr.org/	https://www.ijedr.org/papers/IJEDR1904083.pdf	OTHER
6	Some common fixed point theorems for weakly compatible mappings in complex valued Rectangular metric spaces	Dr. Naval Singh	Mathematics	International Journal of Innovation in Science and Mathematics	2019-20	2347-9051	http://ijism.org/	https://www.ijism.org/administrator/components/com_jresearch/files/publications/IJISM_801_FINAL.pdf	Index coper.
7	Triple fixed point theorems in complex valued metric spaces, using rational inequality	Dr. Naval Singh	Mathematics	Journal of Computer and Mathematical Sciences	2019-20	0976-5727	http://www.compmath-journal.org/	http://www.compmath-journal.org/dnload/Neelu-Rajput-and-Naval-Singh-/CMJV10104P0722.pdf	Index coper.
8	Common fixed point theorems in complex valued b-metric spaces	Dr. Naval Singh	Mathematics	International Journal of Scientific Research in Mathematical and Statistical Sciences	2019-20	2348-4519	https://isroset.org/journal/IJSRMSS/index.php	http://www.scik.org/index.php/jmcs/article/view/2319	UGC Listed
9	A new type of α -F-contraction on common fixed point theorems in metric spaces and its application	Dr. Naval Singh	Mathematics	Bull.Pure Appl. Sci. Sect. E Maths. Stat.	2019-20	0970-6577	https://bpasjournal.s.com/math-and-stat/	https://bpasjournals.com/admin/upload/dynamic2/650-660-bpas-e-dec.2019.pdf	Indian Science Abstract; ProQuest
10	Coupled fixed point theorem for generalized F-contraction in complete complex valued metric space	Dr. Naval Singh	Mathematics	IJREAM	2019-20	2454-9150	https://www.ijream.org/	http://ijream.org/papers/IJREAMV05I0250021.pdf	UGC Listed

11	Common fixed theorem for rational expression in fuzzy metric space	Dr. Naval Singh	Mathematics	Journal of the Gujrat Research Society	2019-20	0374-8588	http://www.gujaratresearchsociety.in/index.php/JGRS	http://gujaratresearchsociety.in/index.php/JGRS
12	Formulation of fish feed using medicinal herb curcuma Amada and its Biochemical And Haematological changes in Labeo Rohita	Dr.Sanjay Telang	zoology	archives	2019-20	2250-1177	https://doi.org/10.22270/iddt.v9i13-52800	http://jddt.in
13	Trophic status of a topical water body during a decade	Dr.Rajni Raina Wanganeo	zoology	Asian J.E exp. Sci.	2019-20	ISSN:0971-5444	www.ajesjournal.com	https://images.ajesjournal.com
14	Seasonal variation in planktonic fauna of sarangpani pond bhopal	Dr.Rajni Raina Wanganeo	zoology	J. of chemical biological and physical sciences	2019-20	2249-1929	JCBPS (jcbps.org)	(PDF) Planktonic Fauna of Sarangpani Pond, Bhopal
15	Impact of Anthropogenic Activities on Macrobenthic Biodiversity of Kaliasote Dam of Bhopal, Madhya Pradesh, India	Dr. Mukesh Dixit	Zoology	International Journal of Biosciences IJB Vol. 15, No. 5, p. 9-24, 2019	2019-20	ISSN: 2220-6655 (Print), 2222-5234 (Online)	International Journal of Biosciences-Open Access, Peer Reviewed Journal (innspub.net)	Impact of Anthropogenic Activities on Macrobenthic Biodiversity of Kaliasote Dam, Madhya Pradesh
16	A study on physico-chemical parameters of Halali Dam in Vidisha district(M.P) Bhopal	Dr. Mukesh Dixit	Zoology	International Journal of Advanced Science and Research	2019-20	2455-4227	Vol. 4, Issue 5 (2019) International Journal of Advanced Science and Research (allsciencejournal.com)	International Journal of Advanced Science and Research (allsciencejournal.com)

2019-20



Ordered weak φ -contractions in cone metric spaces over Banach algebras and fixed point theorems

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Abstract

In this work, we introduce the class of ordered weak φ -contractions in cone metric spaces over Banach algebras and prove some fixed point results for the mappings belonging to this new class. Our results generalize and extend some known fixed point results in cone metric spaces to the spaces equipped with a partial order. Some examples are given which illustrate the results proved herein.

Keywords: Cone metric space; ordered weak φ -contraction; fixed point.

2010 MSC: 47H10; 54H25.

1. Introduction

In 1922, Banach [1] proved the famous Banach contraction principle and showed how it can be used to solve existence problems of integral equations. The Banach contraction principle and its generalizations are at the center of various research activities, and are the main source of the inspiration of metric fixed point theory.



A GENERALIZATION OF NADLER THEOREM IN CONE b -METRIC SPACES OVER BANACH ALGEBRAS

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Abstract. In this paper, we prove some coincidence point and common fixed point results for hybrid pairs of mappings defined on a cone b -metric space. Our results generalize the famous Nadler fixed point theorem and some recent results on cone b -metric spaces. An example is presented to illustrate our main result.

Keywords. Cone b -metric space; H -cone b -metric space; Coincidence point; Common fixed point.

2010 Mathematics Subject Classification. 47H10, 54H25.

1. INTRODUCTION

The Banach contraction principle is one of the most interesting and applicable result in mathematics. It says that:

If (X, d) is a complete metric space and $T : X \rightarrow X$ is a contraction mapping on X , i.e., T satisfies the following property: there exists $\lambda \in [0, 1)$ such that

$$d(Tx, Ty) \leq \lambda d(x, y) \text{ for all } x, y \in X.$$

Then mapping T has a unique fixed point in X , i.e., there exists a unique $x^ \in X$ such that $Tx^* = x^*$.*

The mapping considered by Banach was a single-valued mapping, i.e., for every $x \in X$ the image Tx of x under T is a unique point in X .

Let (X, d) be a metric space. Denote by $CB(X)$, the set of all closed and bounded subsets of the space X . Pompeiu and Hausdorff introduced a function $d_H : CB(X) \times CB(X) \rightarrow \mathbb{R}$ such that the pair

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Fixed Point Theorem For T-Zamfirescu Mapping On Cone Metric Spaces

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Abstract - The Intention Of This Paper Is To Obtain Sufficient Conditions For The Existence Of A Unique Fixed Point Of T-Zamfirescu In Complete Cone Metric Spaces And We Introduce T-Mann Iteration And Study The Convergence Of These Iterations For The Class Of T-Zamfirescu Operators In Real Banach Spaces. Improves The Corresponding Result Proved By Morales And Rojas [6].

keywords - Cone Metric Space, T-Zamfirescu Mapping , Cone Normed Space

1. Introduction:-

Huang and Chang [8] gave the notion of cone metric space, replacing the set of real numbers by ordered Banach Space and introduced some fixed point theorems for function satisfying contractive conditions in Banach Spaces. Sh. Rezapour and R. Hamalbarani [12] were generalized result of [8] by omitting the normality condition, which is milestone in developing fixed point theory in cone metric space. After that several articles on fixed point theorems in cone metric space were obtained by different mathematicians such as M. Abbas, G. Junck [9], D. Ilic [2] etc

In contrast, A. Beiranvand etc [1] introduced the T-contraction and T-contractive mappings and then they extended the Banach contraction principle and the Edelstein's fixed point Theorem.

The T-Kannan contractive mappings introduced by S. Moradi [13], and extend in this way the Kannan's fixed point theorem [10]. The corresponding version of T-contractive, T-Kannan mappings and T-Chalterjea contractions on cone metric spaces was studied in [4] and [5] respectively, obtained sufficient conditions for the existence of a unique fixed point of these mappings in complete cone metric spaces. In [6] they studied the existence of fixed points for T-Zamfirescu operators in complete metric spaces and proved a convergence theorem of T-Picard iteration for the class of T-Zamfirescu operators.

In analysis of these facts, thus the purpose of this paper is to study the existence of fixed points of T-Zamfirescu defined on a complete cone metric space (X, d) , generalizing consequently the results given in [3] and [14], and we introduce T-Mann iteration and establish strong convergence theorems of these iteration schemes to the fixed point of T-Zamfirescu operators in real Banach spaces.

2. Preliminaries & Definition

Definition 2.1. Let $(E, \|\cdot\|)$ be a real Banach space. A subset $P \subseteq E$ is said to be a cone if and only if

- (i) P is closed, nonempty and $P \neq \{0\}$
- (ii) $a, b \in R, a, b \geq 0, x, y \in P$ implies $ax + by \in P$
- (iii) $P \cap (-P) = \{0\}$

For a given cone P subset of E , we define a partial ordering \leq with respect to P by $x \leq y$ if and only if $y - x \in P$. We shall write $x < y$ to indicate that $x \leq y$ but $x \neq y$ while $x \ll y$ will stand for $y - x \in \text{int } P$ where $\text{int } P$ denotes interior of P and is assumed to be nonempty.

Definition 2.2. [7] Let X be a nonempty set. Suppose that the mapping $d : X \times X \rightarrow E$ satisfies

- (i) $0 \leq d(x, y)$ for every $x, y \in X, d(x, y) = 0$ if and only if $x = y$.
- (ii) $d(x, y) = d(y, x)$ for every $x, y \in X$.
- (iii) $d(x, y) \leq d(x, z) + d(z, y)$ for every $x, y, z \in X$.

Then d is a cone metric on X and (X, d) is a cone metric space.

Example 2.3 [3] Let $E = R^n, P = \{(x, y) \in E : x, y \geq 0\} \subset R^2, X = R$ and $d : X \times X \rightarrow E$ such that $d(x, y) = (|x - y|, \alpha|x - y|)$, where $\alpha \geq 0$ is a constant. Then (X, d) is a cone metric space.

Definition 2.3. Let E be a Banach space and $P \subset E$ a cone. The cone P is called normal if there is a number $K > 0$ such that for all $x, y \in E$,

$$0 \leq x \leq y \text{ Implies } \|x\| \leq K\|y\|$$

The least positive number satisfying the above is called the normal constant of P .

Definition 2.4. [11] Let X be a vector space over R . Suppose the mapping $\|\cdot\| : X \rightarrow E$ satisfies

A Fixed Point Theorem To The Relation Between Normal Maps To Weakly Zamfirescu Maps In The Weak Concept

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Abstract : – Zamfirescu gave a fixed point theorem that generalizes the classical fixed point theorem by Banach , Kannan and chatterjea. In this paper we follow the idea of David Ariza-Ruiz and Antonio Jimenez-Melado to extend Zamfirescu’s fixed point theorem to the class of weakly zamfirescu maps .A continuous method for this class of maps is also given the weak concept.

Keyword- Fixed point, zamfirescu mapping ,weakly contractive mapping, continuation method.

Introduction: -

In [9] Zamfirescu obtained a very intresting fixed point theorem on complete metric space by combining the result of Banach space [1] Kannan [7] and chatterjea [6]. We introduce the concept of weakly Zamfirescu maps and we study the existing independence between some types such as Contractions maps, Kannan maps, Chatterjea maps and its respective weak concepts . (see[1],[2],[3]and[5].) Moreover we expend Zamfirescu’s fixed point theorem[9] to the class of weakly zamfirescu maps and then we prove a continuation method for this class of maps, extending various known results also we obtain for weakly zamfirescu mappings a simple expression of Cauchy modulus and modulus of convergence (see[4]).

(Banach,1922) There is $\alpha \in(0,1)$ s.t.

$$d(Tx,Ty) \leq \alpha d(x,y) \quad \text{for all } x,y \in X \dots\dots\dots(C)$$

(Kannan,1968) There is $K \in(0,1)$ s.t.

$$d(Tx,Ty) \leq \frac{K}{2} [d(x,Tx)+d(y,Ty)] \quad \text{for all } x,y \in X \dots\dots\dots(K)$$

(Chattejea,1972) There is $\xi \in(0,1)$ s.t.

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Abstract - The Intention Of This Paper Is To Obtain Sufficient Conditions For The Existence Of A Unique Fixed Point Of T-Zamfirescu In Complete Cone Metric Spaces And We Introduce T-Mann Iteration And Study The Convergence Of These Iterations For The Class Of T-Zamfirescu Operators In Real Banach Spaces. Improves The Corresponding Result Proved By Morales And Rojas [6].

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Example 2.3 [3] Let $E = R^n, P = \{(x, y) \in E : x, y \geq 0\} \subset R^2, X = R$ and $d: X \times X \rightarrow E$ such that $d(x, y) = (|x - y|, \alpha|x - y|)$, where $\alpha \geq 0$ is a constant. Then (X, d) is a cone metric space.

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Definition 2.4. [11] Let X be a vector space over R . Suppose the mapping $\|\cdot\| : X \rightarrow E$ satisfies

Some Common Fixed Point theorems for Weakly Compatible Mappings in Complex Valued Rectangular Metric space

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Abstract –In this paper we introduce some common fixed point theorems for weakly compatible mappings under contractive type condition in complex valued rectangular metric space. Moreover, we give some illustrative examples which are useful to obtain the results. The recent works presented by authors were more generalized and improve many existing results of literature.

Keywords – Complex Valued Metric Space, Weakly Compatible Mapping, (E.A) Property, (CLR) Property.

I. INTRODUCTION

Fixed point theory is one of the most famous and traditional theories in the fields of nonlinear analysis. In this theory, contraction is one of the main tools to prove the existence and uniqueness of a fixed point. The Banach contraction principle which gives an answer to the existence and uniqueness of a solution of an operator equation $Tx = x$, is the most generally used fixed point theorem in all of analysis. The existing material of fixed point theory contains a large of amount of generalizations of Banach contraction principle by using various form of contraction condition in different spaces. The idea of complex valued metric spaces was introduced and studied by Azam et.al[1]. They have been established some common fixed points results for mappings satisfying a rational inequality. Abbas et al. [2] discussed the common fixed point of mappings satisfying rational inequalities in ordered complex valued generalized metric space. They changed the triangular inequality in the complex valued metric by the rectangular inequality containing four points and extended the idea of complex valued metric spaces introduced by Azam et al. [1]. Chauhan et al. [3] proved fixed point theorems in fuzzy metric spaces satisfying ϕ -contractive condition with common limit range property. In 2013 Chandoke and Kumar [4] studied the some fixed point result for rational contraction mappings in complex valued metric spaces. More recently Singh et al. [5], and Patil and Salunke [6] proved some common fixed point theorems for weakly compatible mappings in

Triple Fixed Point Theorems in Complex Valued Metric Spaces, using Rational Inequality

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ABSTRACT

In this paper, we prove common tripled fixed point theorems for a pair of mapping satisfying certain rational contraction in complex valued metric spaces.

Keywords: Common fixed point, complex valued metric spaces, Triple fixed point.

1. INTRODUCTION

In 2011, Azam *et al.*² introduced the notion of complex valued metric spaces and obtained sufficient condition for existence of common fixed point of a pair of contractive type mappings involving rational type mappings which is a generalization of the classical Banach contraction principal³. In 2006 Bhaskar and Lakshmikantham⁵ introduced the concept of coupled fixed points for a given partially ordered set X . There after S.M. Kang *et al.*⁸ introduced the notion of coupled fixed point for a mapping in complex valued metric spaces. Recently, Berinde and Borcut^{6,4} introduced the notion of tripled fixed point for nonlinear contractive mappings in partially order complete metric spaces and obtained tripled coincidence and fixed point theorems for commuting mappings. Very recently Roldan *et al.*¹⁰ introduced the tripled fixed point in fuzzy metric spaces and proved existence and uniqueness theorem for contractive type mappings in fuzzy metric spaces. In this manner many researchers have contributed their works in coupled and tripled fixed point. For detailed development one can see in^{1,7,8,9}. In order to that we consider as light modification of the concept of tripled fixed point for a mapping in complex valued metric spaces as follows. We recall some definitions and notations that will be used in our note.



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COMMON FIXED POINT THEOREMS IN COMPLEX VALUED b - METRIC SPACES

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Abstract. In this paper, common fixed point theorems for a pair of mappings satisfying certain rational contractions are established in the framework of complex valued b - metric spaces. Some examples are provided to support our main results.

Keywords: Cauchy sequence; common fixed point; complex valued b -metric spaces; weakly compatible mappings; contractive type mapping.

2000 AMS Subject Classification: 47H10, 54H25.

1. Introduction

In 1922, Banach proved contraction principle [7] which provides a technique for solving existence problems in many branches of mathematical sciences and engineering. Subsequently Banach contraction principle was generalized, extended and improved by many authors in different ways. In 1998, Czerwik [9] introduced the concept of b - metric space. In 2011, Azam

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A new type of $\alpha - F -$ contraction on common fixed point theorems in metric spaces and its application *

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Abstract In this paper we introduce the notion of $F -$ contraction via $\alpha -$ admissible pair of mappings. We also provide many common fixed point results regarding rational expressions in the setting of metric spaces. Moreover, we also present some illustrated examples as an application of this concept and we also establish an existence theorem for integral equations.

Key words Common fixed point, Metric space, $\alpha -$ admissible mappings, $F -$ contraction.

2010 Mathematics Subject Classification 47H10, 54H25.

1 Introduction and preliminaries

Banach fixed point theorem is one of the most remarkable results in the theory of metric spaces. In 1922, the Polish mathematician Banach [1] established a very important result regarding a contraction mapping, known as the Banach contraction principle. One of the biggest common applications of fixed points of contractive mappings noted for particular types of spaces is the acceptance of the existence and uniqueness of solutions of nonlinear functional equations. One of such tools was newly concluded by Wardowski [2], where the author introduced a new family of mappings, the so called F or \mathfrak{S} family. He notified a new concept of contraction condition called $F -$ contraction and proved a fixed point theorem which generalizes the Banach contraction principle. Secelean [3] proved fixed point theorems by iterated function systems consisting of $F -$ contractions. In 2013, Sgroi and Vetro [4] discussed the multivalued $F -$ contractions and the solution of certain functional and integral equations. Afterwards Piri and Kumam [5] proved fixed point result for $F -$ Suzuki contractions which generalizes the result of Wardowski [2]. $F -$ contractive mappings of Hardy-Rogers type and Ćirić type were investigated by Cosentino and Vetro [6] and Minak et al. [7]. Later on, Ahmad et al. [8] recalled the concept of new fixed point theorems for generalized $F -$ contraction in complete metric spaces. Klim and Wardowski [9] investigated the fixed points dynamic processes of set valued $F -$ contractions. Further Khan et al. [10] studied two new types of fixed point theorems for $F -$ contraction. Some fixed point theorems for

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Coupled fixed point theorem for generalized F-contraction in complete Complex valued metric space

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Abstract Wardowski introduced a new concept of contraction and proved a fixed point theorem which generalizes Banach contraction principle. Following this direction of research, in this paper, we prove common Coupled fixed point theorem which satisfy an F- contractive condition for self mapping in complete complex valued metric space.

MSC: 47H10, 54H25.

Key words: Complex Valued metric space, Coupled fixed point, F- contraction.

1. Introduction and preliminaries:

The fixed point theory is very important and useful in mathematics because of its application in various areas such as variation and linear inequalities approximation theory physics and computer science. the Banach contraction principle [3] is very popular and effective tool in solving existing literature of fixed point theory contain a great no of generalizations of Banach contraction principle by using different form of contraction condition in various space but majority of such generalization are obtained by improving underlying contraction condition which also includes contraction condition described by rational expressions. In 2011 Azam et al [2] introduce the notation of complex valued metric space and established some fixed point results for pair of mapping for contraction condition satisfying a rational expression

Let C be the set of complex numbers and let $z_1, z_2 \in C$.

Define a partial order \preceq on C as follows: $z_1 \preceq z_2$ if and only if $Re(z_1) \leq Re(z_2)$, $Im(z_1) \leq Im(z_2)$.

It follows that: $z_1 \preceq z_2$ if one of the following conditions is satisfied:

- (1) $Re(z_1) = Re(z_2)$, $Im(z_1) < Im(z_2)$,
- (2) $Re(z_1) < Re(z_2)$, $Im(z_1) = Im(z_2)$,
- (3) $Re(z_1) = Re(z_2)$, $Im(z_1) = Im(z_2)$.

In particular, we will write $z_1 \preceq z_2$ if $z_1 \neq z_2$ and one of

(1), (2) and (3) is satisfied and we will write $z_1 < z_2$ if only (3) is satisfied.

Definition 1.1: [2] Let X be a nonempty set. Suppose that the mapping

$d : X \times X \rightarrow C$ Satisfies:

- (a) $0 \preceq d(x, y)$ for all $x, y \in X$ and $d(x, y) = 0$ if and only if $x = y$
- (b) $d(x, y) = d(y, x)$ for all $x, y \in X$
- (c) $d(x, y) \preceq d(x, z) + d(z, y)$ for all $x, y, z \in X$.

Then d is called a complex valued metric on X and (X, d) is called a complex valued metric space.

Definition 1.2: [2] Let $\{x_n\}$ be a sequence in X and $x \in X$. If for every $c \in C$, with $0 < c$

there is $n_0 \in N$ such that for all $n > n_0$, $d(x_n, x) < c$, then x is called the limit of

$\{x_n\}$ and we write $\lim_{n \rightarrow \infty} x_n = x$ or $x_n \rightarrow x$ as $n \rightarrow \infty$.

Definition 1.3: [2] If every Cauchy sequence is convergent in (X, d) , then (X, d) is called a Complete Complex valued metric space.

Lemma 1.4: [2] Let (X, d) be a complex valued metric space and $\{x_n\}$ a sequence in X , Then $\{x_n\}$ converges to x if and only if $|d(x_n, x)| \rightarrow 0$ as $n \rightarrow \infty$.

Lemma 1.5: [2] Let (X, d) be a complex valued metric space and $\{x_n\}$ a sequence in X . Then $\{x_n\}$ is a Cauchy sequence if and only if $|d(x_n, x_{n+m})| \rightarrow 0$ as $n \rightarrow \infty$ where $m, n \in N$.



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Common Fixed Point Theorem for Rational Expression in Fuzzy Metric Space

Umashankar singh et al.



Abstract

In this Paper, we are proving common fixed point for rational expression using by common E.A like property in fuzzy metric space which generalized the result of K. Wadhwa et.al.

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Mallik et al

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Research Article

Formulation of Fish Feed Using Medicinal Herb *Curcuma Amada* and Its Biochemical and Haematological Changes in *Labeo Rohita*

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ABSTRACT

A characteristic feature of fish is the wide physiological range of blood parameters and also the large individual variations. The aim of this study was to evaluate the haematological profile and biochemical profile of fish *Labeo rohita*. The blood parameters viz., total WBC and RBC count, Hb, MCV, MCH and MCHC values were analyzed using standard methods. The differences found in this study can be attributed to the feeding behaviour, life style and adaptation of the different fish species to the habitat in which they dwell. *Curcuma amada* Roxb is commonly known as mango ginger. It is a perennial, rhizomatous, aromatic herb belonging to the family Zingiberaceae. The ranges of serum biochemistry vary from species to species and can be influenced by many biotic and abiotic factors such as water temperature, seasonal pattern, food, age and sex of the

Trophic status of a tropical water body during a decade.Nisar Ahmad Ganie^{1*}, Ashwani Wanganeo¹, Rajni Raina²¹ Department of Environmental Sciences and Limnology Barkatullah University Bhopal.² Department of Zoology, Govt Science and Commerce College (Banazeer) Bhopal.

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Abstract: The present study accesses the trophic status in relation to aquatic insect diversity of the Upper Lake of Bhopal. The results revealed an increase in the physico-chemical parameters viz., Total dissolved solids (TDS), electrical conductivity (EC), calcium hardness, total hardness, nitrate and orthophosphate when related with earlier studies (Wanganeo *et al.*, 2011 and Bhat *et al.*, 2012). The lake was found to be alkaline with pH (\bar{x} = 8.14 units) and can be categorized as alkaliphilous. Moderate electrical conductivity (\bar{x} = 279.5 μ S_{cm}-1) puts the water body under Mesotrophic status. Higher average alkalinity values (78.90 mg_l-1) categorizes the water body into nutritionally rich. Higher nitrate values (\bar{x} = 1.24 mg_l-1) puts the water body into the eutrophic condition. The overall study predicts the mesotrophic nature of Upper Lake of Bhopal. A total of 39 genera of aquatic insects belonging to 6 orders were recorded from the upper lake during the present study.

Key words: Trophic status, Aquatic insects, Upper Lake.

Introduction

Trophic status is a way of classifying lakes and describing lake processes in terms of the productivity of the system. It is an important aspect that needs to be monitored frequently as it is directly related with the incoming sewage and other wastes in the aquatic systems. The quality of the water and the health of the aquatic ecosystem of lakes are very sensitive issues and lakes in different regions of the world particularly in developing countries are facing a variety of problems associated with anthropogenic activities and unsustainable use of their resources. The chemical parameters play a prominent role in predicting the trophic status of a water body. The most important parameters that describe the trophic status of a water body are pH, conductivity, total alkalinity, phosphorus and nitrate + nitrogen. The dynamic nature of the productivity and eutrophication as a result of natural and anthropogenic factors leaves no single assessment variable as a true measure of the eutrophication status of a given water body (Xu *et al.*, 2001 and Padisak *et al.*, 2009). Continuous monitoring and assessing the aquatic environment for eutrophication is essential to mitigate adverse environmental and economic impacts (Devlin *et al.*, 2005).

Study area

Bhopal, the capital city of Madhya Pradesh and popularly known as the city of lakes is famous for its numerous lakes, out of which Upper lake is most popular. Upper Lake is placed within the geographical coordinates of 23.25°N and 77.34°E. The lake was known as the **Upper Lake** or Bada Talab (Big Pond) until March (2011). It was renamed as Bhojtaal in honour of the Great King Raja Bhoj who built it. The lake was created by constructing an earthen dam across

the Kolans river, formerly a tributary of the Halali river. The Bhojtaal (Upper Lake) spans an area of 31 km², and drains a catchment of 361 km². It is the beauty queen of Bhopal and an important source of potable water that meets the demand of drinking water for almost 40% (30 million gallons per day) for the growing population of the Bhopal city. Upper Lake being wetland in nature is a hotspot of biodiversity and provides economic benefit to number of riparian owners in terms of fish production.

Methodology

The various physico-chemical parameters were analysed following the standard procedures as documented by (Adoni *et al.*, 1985) and (APHA 2005). The collection of aquatic insects was done mainly during the early hours of the day. Sampling was done using various nets such as D hand net (30 × 30 cm frame), 250 μ m and 20 μ m mesh size nets. The nets were scooped through the water within an area of 1m² for quantitative analysis. For qualitative enumeration of insects net was hauled throughout the sampling station. Then the material collected through nets was sieved (mesh size: 10 μ m and 25 μ m). During sieving water was sprinkled on the sample. The aquatic insects were then collected with the help of forceps and brush using a 10X magnifying lens. Aquatic insects were identified upto the genera level following the works of (Pennak 1978 and Subramanian 2005).

Results and discussions:

The physico-chemical characteristics as given in Table 1 depict the considerable variation during a period of 10 years.



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Research Article

Seasonal Variation in Planktonic Fauna of Sarangpani Pond, Bhopal

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Abstract: Present study was aimed to assess the zooplankton diversity and entire ecological condition of Sarangpani pond of Bhopal city. Total of 78 zooplankton species were recorded from the ponds waters during two years of study period which consisted of Rotifera 29 species (37%), Cladocera & Protozoa 16 species each (20% each), Copepoda 13 species (17%) and Ostracoda 4 species (5%). Among all the zooplankton classes, species belongs to the class Rotifera were recorded their dominance during both the years of study. The dominance of Rotifers population in terms of quality has been recorded. Seasonal variation of zooplankton population recorded maximum species diversity of class Rotifera during summer (1st year) and winter season (2nd year). On the other hand, minimum population density was contributed by class Copepoda in all the season. Presence of various pollution indicator zooplankton species indicates and evidences the high anthropogenic pressure and direct mixing sewage from the nearby catchment in the pond waters which has accelerated the eutrophication in the Sarangpani pond.

Keywords: Zooplankton, Trophic status, anthropogenic activities, Sewage pollution.



Impact of Anthropogenic Activities on Macrobenthic Biodiversity of Kaliasote Dam of Bhopal, Madhya Pradesh, India

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Key words: Dam, Anthropogenic Activities, Nutrient Enrichment, Pollution.

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Abstract

Present study was conducted to understand the impact of anthropogenic activities on macrobenthic biodiversity of the Kaliasote Dam which is one of the important multipurpose water bodies of Bhopal. The study reveals that the water quality of the Kaliasote Dam has shown the sign of deterioration at several places due to increasing anthropogenic pressure. Though average values of most of the parameters are within the permissible limit of CPCB however concentration of BOD (1.2 mg/l to 12 mg/l) and COD (8 mg/l to 31 mg/l) reveals moderate degree of organic pollution at some intervals. All the water samples collected during the period 2015-17 contain significant amount of nitrate and orthophosphate that facilitated growth and development of few indicator species of macrobenthic community. In general on the basis of physical, chemical and macro zoo benthic study, the Dam water can be classified as moderately polluted water body.

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A study on physico-chemical parameters of Halali Dam in Vidisha district (MP) Bhopal

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Abstract

Present study deals with Physico-chemical parameters of Halali reservoirs situated in Vidisha District of Bhopal (M.P.) India. Monthly variations in physical and chemical parameters such as Air Temperature (26°C to 34.4°C), Water Temperature (18.5 to 27.8 °C), pH (7.2 to 8.5), Dissolved Oxygen (6.0-7.2 mg/L), TDS (151 to 267 mg/l). Total Hardness (66 to 80mg/L), Chlorides (14 to 65 mg/L), Phosphate (0.00 to 0.04 mg/L) Nitrate (0.74 to 3.10mg/L) etc, were investigated. All physicochemical parameters were observed within the standard limits of WHO and BIS (2012).

Keywords: Physico-chemical parameter, Halali reservoirs, WHO, BIS

1. Introduction

Rivers are the most important sources of fresh water. All the living organisms on the earth need water for their survival. Earth is the only planet having about 70 percent of water. But due to increase in human population, industrialization, use of fertilizers in agriculture and manmade activity made it highly polluted (Mohan *et al.*, 2012). To assess the water quality physicochemical analysis is the prime deliberation for its best utilizations like drinking, irrigation, fisheries, industrial purposes and is also helpful in understanding the complex processes. The objective of the present study was to assess the quality of water by means of physicochemical parameters.

Study area

The Halali reservoir is situated in the Vidisha district of Madhya Pradesh, India. This reservoir was built on the Halali River, and lies 40 km away from the state capital Bhopal. It coordinates 23.49°N 77.51 °E.

Methodology

The river water samples were collected from the Halali Dam. The analysis of parameters like water temperature, air temperature, pH, DO was observed to assess the degree of pollution. Other parameters like TDS, specific conductivity, total alkalinity, total hardness, chlorides, nitrate and biological oxygen demand were analyzed as per the standard guidelines and procedures (APHA, 2012).

Results and Discussions

Air Temperature

During the present study the Air Temperature varied from 26°C to 34.4°C. The maximum air temperature was recorded 36°C in the month of June and minimum air temperature was recorded in the month of January (Table 1). Similar observations were reported by Wanganeo *et al.*, (2007) ^[1] in Sarangani pond Bhopal and Khan *et al.*, (2016) ^[2] in lower lake.

Water Temperature

During the present study the Water Temperature varied from 18.5 to 27.8 °C. The maximum air temperature was

recorded 27.8° in the month of June and minimum air temperature was recorded in the month of January (Table 1). Similar water temperature pattern was observed by Priyatharsini and Dhanalakshmi (2016) ^[3] in the Vembanoor wetland; Khan *et al.*, (2016) ^[2] in the lower lake and Surve *et al.*, (2005) ^[4] in the Kandhar Dam.

pH (Hydrogen ions concentrations)

In the present study at Halali Dam minimum value (7.2 units) of pH was recorded in December and maximum value of pH (8.5 units) was recorded in the month of May (Table 1). Higher average value of summer seasons may be due to low water level and higher concentrations of nutrients in water and minimum average value of pH in winter it may be due to low temperature and less photosynthesis. Ramakrishna (2003) ^[5] while working on Nagchoon pond also reported maximum in summer and minimum in winter due to increase in bicarbonate ions in water. Similar results were observed by Hutchinson (1957) ^[6]; Agarwal and Rajwar 2010 in Tehri Dam. The permissible limit of pH (6.5 to 8.5 units) for drinking purposes has been documented by BIS (2012).

TDS (Total Dissolved Solids mg/l)

The minimum (151mg/l) and maximum (267mg/l) value of TDS were recorded in the months of January and June respectively (Table 1). Similar observations were observed in Tighra reservoir by Uchchhariya (2012) ^[8] in Tighra reservoir and Minor Keenjhar lake by Korai *et al.*, (2008) ^[9].

Specific Conductivity (µS/cm)

The specific conductivity showed a minimum value of 180µS/cm and a maximum value of 353µS/cm in the months of February and June respectively which is below the standard level (1400 µS/cm) as per WHO (Table 1). Similar results observed by Wanganeo *et al.*, (2011) ^[1] and Raina *et al.*, (1981).

Nitrate (mg/l)

In the present study of work minimum (0.48mg/l) and maximum (2.31mg/l) values of nitrate were recorded in the