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MEHERBABA PUBLISHERS

Plot No. 91, New Narsala Road,

Indra Nagar, Nagpur

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1st Edition - 2023

ISBN: 978-93-87558-30-4

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Sub: Regarding authorship of the Chapter

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Sub: Regarding authorship of the Chapter

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"Research and Reviews in Pharmaceutical and Health Sciences Volume II (ISBN: 978-93-95847-90-2)"
published by our publishing house in February, 2024.

DR. SAGAR A. VHANALAKAR
Managing Editor
BHUMI PUBLISHING
Nigave Khalasa, Kolhapur.
M. S. INDIA 416 207.

Website: www.bhumipublishing.com
E-mail: bhumipublishing@gmail.com

ISBN: 978-93-95847-90-2

Research and Reviews in Pharmaceutical and Health Sciences

Volume II

Editors:
Dr. T. Naga Aparna
Ms. Debajani Naik
Dr. Pankaj Gour
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Bhumi Publishing, India
First Edition: February, 2024

Research and Reviews in Pharmaceutical and Health Sciences

Volume II

(ISBN: 978-93-95847-90-2)

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Bhumi Publishing

February, 2024

Title: Research and Reviews in Pharmaceutical and Health Sciences Volume II

Editors: Dr. T. Naga Aparna, Ms. Debajani Naik, Dr. Pankaj Gour, Dr. Ranjana G. Khade

First Edition: February, 2024

ISBN: 978-93-95847-90-2

Published by:

Bhumi Publishing

BHUMI PUBLISHING

Nigave Khalasa, Tal – Karveer, Dist – Kolhapur, Maharashtra, INDIA 416 207

E-mail: bhumipublishing@gmail.com

Research and Reviews in Pharmaceutical and Health Sciences Volume II

(ISBN: 978-93-95847-90-2)

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ISBN 978-93-95847-90-2

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Recent Advances of NANOTECHNOLOGY in Chemical Sciences

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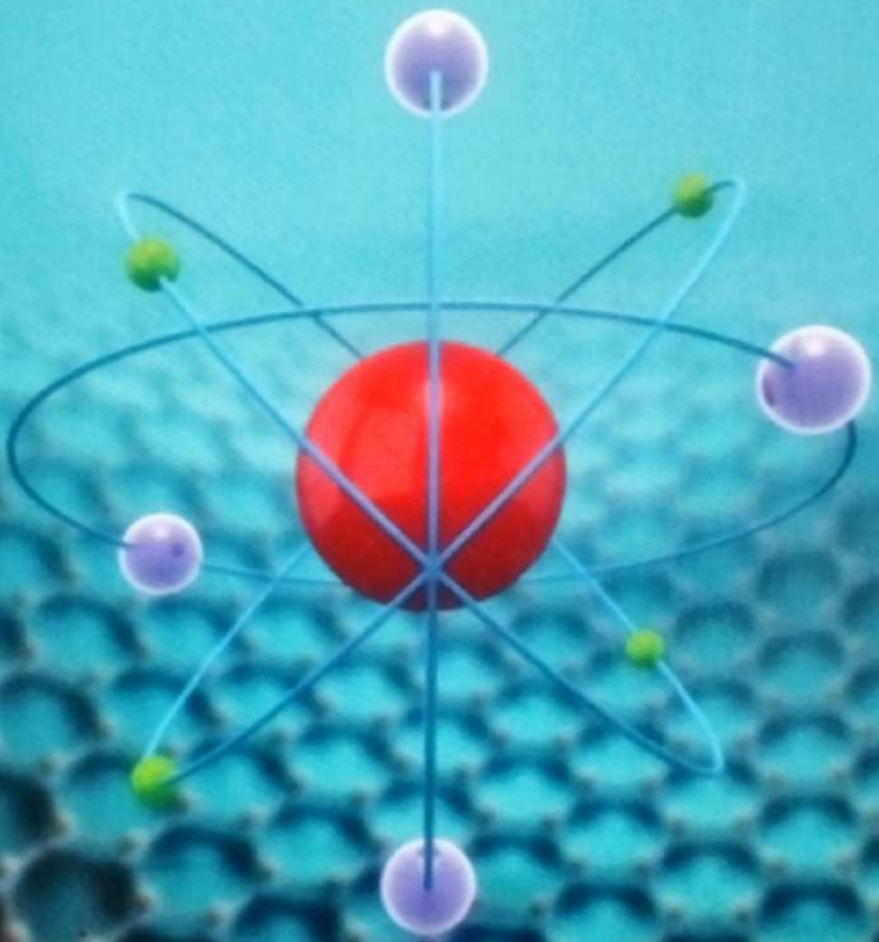

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Website: www.bookrivers.com

Email: publish@bookrivers.com

Mobile: +91-9695375469

1ST Edition: -2023

MRP: 399 /-INR

ISBN: 978-93-5515-927-4

[PRINTED IN INDIA]

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Recent Trends in Characterization of Nanoparticles

Sumina K. Tadavi[1], Sunil B. Zanje[2], Shyam W. Dafare[1], Yashpal U. Rathod[1], Ramdas N. Huse[3], and Wasudao B. Gurnule[4]

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Abstract:

The present-day materials have to be characterized in order to interpret their properties and applications. This chapter illustrates the characterization techniques can be used for macrostructural and microstructural characterization. Recent sophisticated techniques for characterization such as Ultraviolet-Visible (UV-VIS) Spectroscopy, Fourier Transform Infrared Spectroscopy (FT-IR), Nuclear Magnetic Resonance (NMR), Thermogravimetric analysis (TGA), Atomic Force microscopy (AFM), Brunauer-Emmett-Teller (BET), DC Conductivity, Synchrotron, X-ray Diffraction, X-ray photoelectron spectroscopy (XPS), X-ray fluorescence (XRF), X-ray Tomography, Transmission emission microscopy (TEM), Scanning electron microscopy (SEM), Energy-dispersive X-ray spectroscopy (EDX) and few other.

Keywards: NMR, SEM, EDX, TEM, XPS, BET, AFM

Characterization techniques

The present chapter gives a brief account of the various characterization techniques. The fundamental information about various properties of different nanomaterials obtained by using

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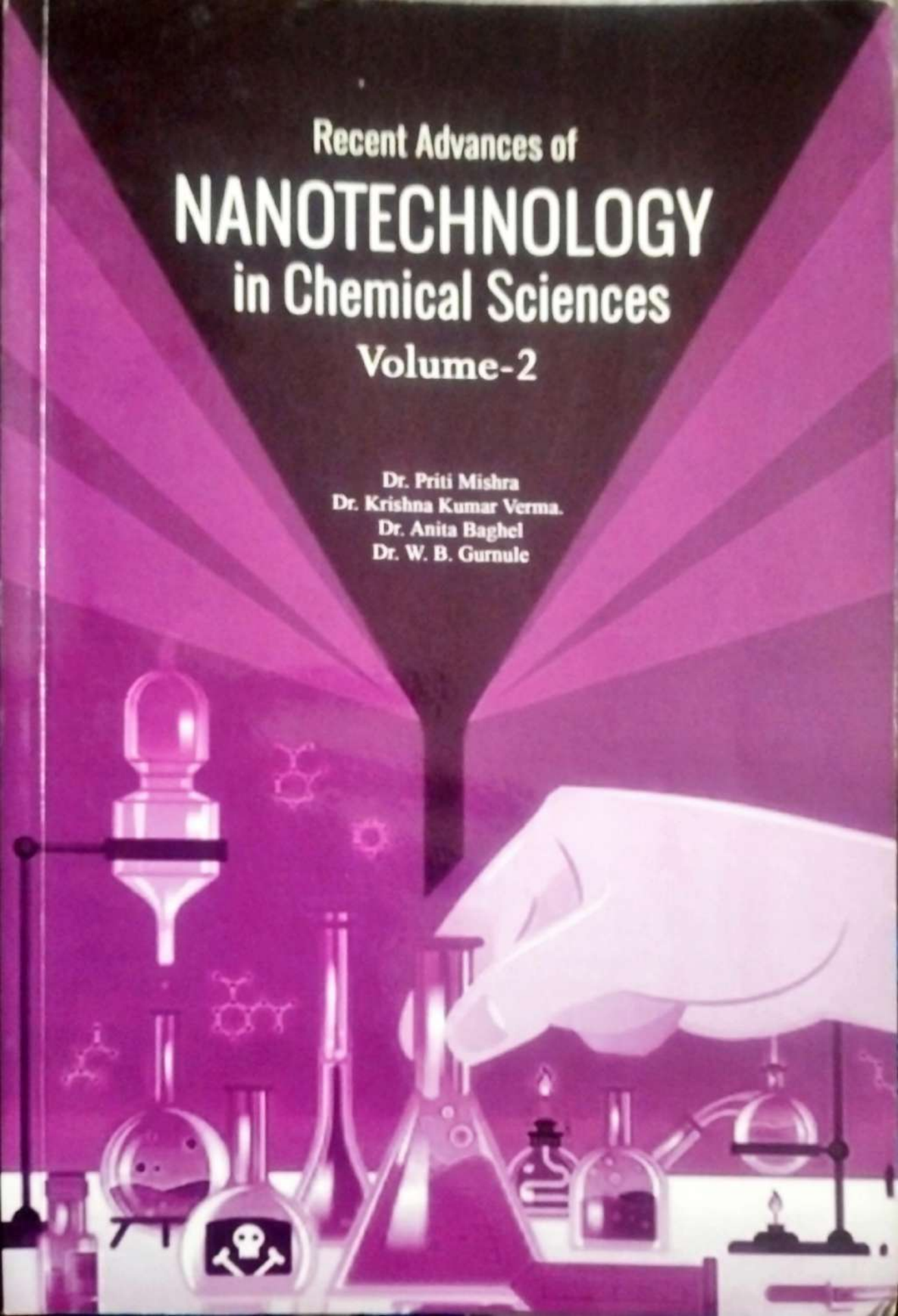

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Published By:Book Rivers

Website: www.bookrivers.com

Email: publish@bookrivers.com

Mobile: +91-9695375469

2nd Edition: -2023

MRP: 499 /-INR

ISBN: 978-93-5842-593-2

[PRINTED IN INDIA]

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Methods for the Synthesis of Nanomaterials

Sunil B. Zanje[1], Samina K. Tadavi[2], Shyam W. Dafare[2], Yashpal U. Rathod[2], Ramdas N. Huse[3], and Wasudao B. Gurnule[4]

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Abstract:

In the modern-day of science, the synthesis of nanomaterials is very significant, because the nanomaterials are multidisciplinary science which deals with physics, chemistry, materials science, other engineering sciences. The present chapter highlighted the different types synthesis methods of nanomaterials. Nanomaterials are synthesized by various methods based on the types and nature of the nanomaterials. In a broad sense "top-down" and "bottom-up" are the two important approaches to synthesize nanomaterials. In top-down method bulk materials have been reduced to nanomaterials, and in case of bottom-up method, the nanomaterials are synthesized from elementary level. The different methods which are being used to synthesize nanomaterials are physical methods, chemical methods and biological methods. In this chapter details of these methods are discussed.

Keywords: Nanomaterials, Physical, Biological, Chemical methods.

ISBN: 978-93-88901-99-4

RESEARCH TRENDS IN LIFE SCIENCE
VOLUME I

EDITORS:
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BHUMI PUBLISHING, INDIA

FIRST EDITION: SEPTEMBER 2023

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Introduction:

Everything which surrounds us is collectively called as the environment. Environment forms a life supporting system for us, since, it is from the environment that we get food to eat, water to drink and air to breathe and all requirements of day-to-day life. In other words, we can say that the basic needs of human life are fulfilled by the materials available in the nature. These materials are air, water, soil, minerals, coal, petroleum, animals and plants. These stocks of nature which are useful to mankind, are called natural resources. Natural resources can be classified into two categories as Renewable resources and Non –Renewable resources.

1. Renewable resources

These resources are present in unlimited quantity in the nature and having the capacity to get replaced by quick recycling through natural cycles. Oxygen in air is renewable resource because it is replaced by the plants by the process of photosynthesis. Some of other resources are solar radiation water and wind. Renewable energy resources are generated directly from nature for example from the sun, rain, wind, tides and it is possible to generate it over and over whenever it is needed. Renewable energy sources are abundant and are definitely the cleanest energy sources in the earth. The advantages of Renewable energy are that wind, sun, ocean and geothermal energy is abundance and completely free of charge. The renewable energy sources have very low or zero carbon emissions, so they are environmental friendly.

2. Non –Renewable resources

Most energy that is used in the world today is generated from non renewable energy sources. This energy can be re-generated over a short period of time. Natural gas and oils are derived from ancient plants and animals remains or fossils. These remain what we have been left with after millions of years of fluctuation in pressure and temperature non renewable energy resources include oil, coal, natural gas and nuclear energy. The advantage non renewable energy sources are it is ready, cheap and easy to use. The non-

Research Trends in Life Sciences Volume I (ISBN: 978-93-88901-99-4)

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Bhumi Publishing

ISBN 978-93-88901-99-4
9 789388 901994

ISBN: 978-93-95847-03-2

RESEARCH TRENDS IN SCIENCE AND TECHNOLOGY VOLUME V

EDITORS:
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BHUMI PUBLISHING, INDIA

FIRST EDITION: NOVEMBER 2023

Research Trends in Science and Technology Volume V

(ISBN: 978-93-95847-03-2)

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Bhumi Publishing

November 2023

ISBN 978-93-95847-03-2

Published by:

Bhumi Publishing,

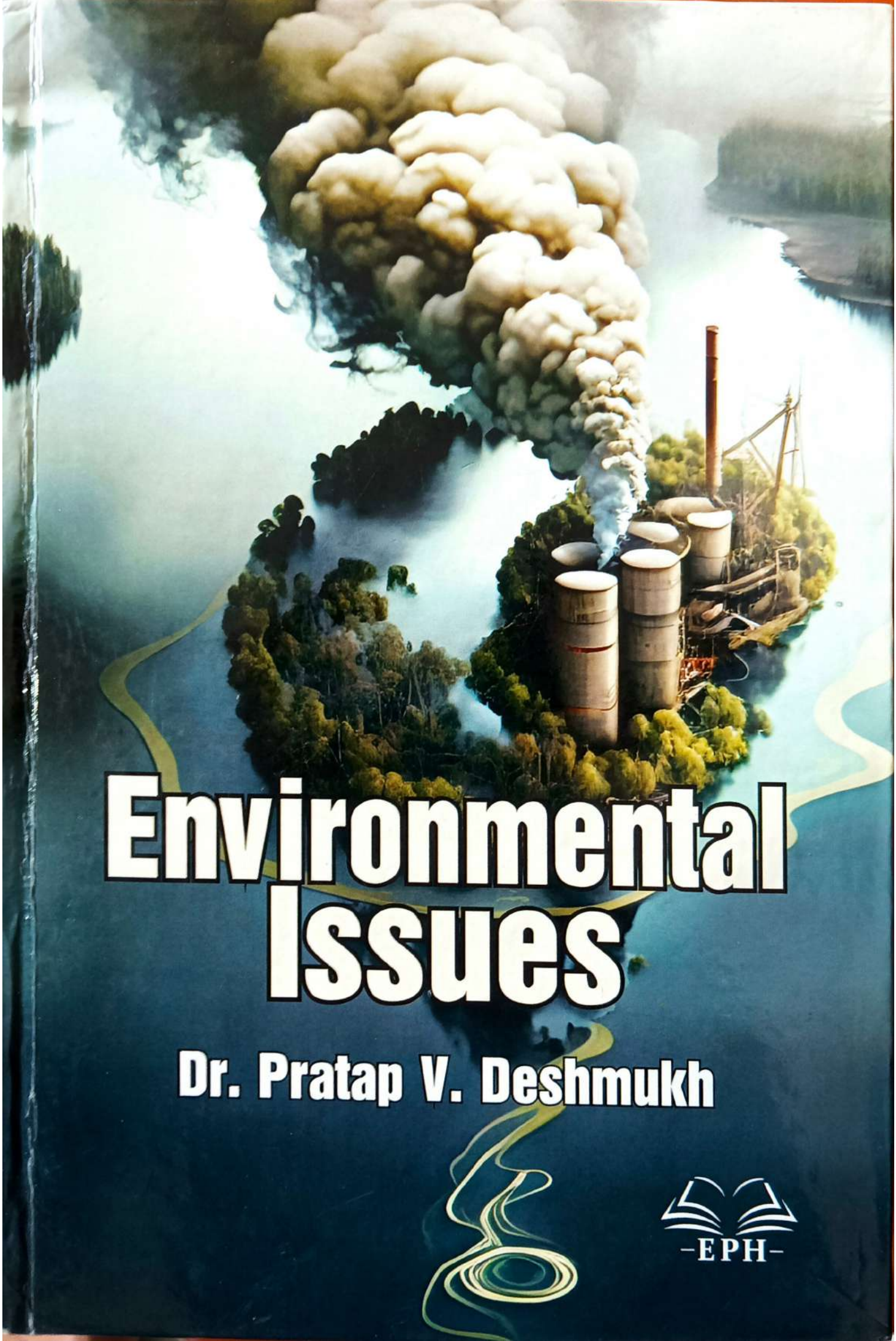
Nigave Khalasa, Kolhapur 416207, Maharashtra, India

Website: www.bhumipublishing.com

E-mail: bhumipublishing@gmail.com

Book Available online at:

https://www.bhumipublishing.com/book/



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First Edition 2023

ISBN : 978-93-58999-84-6

Published by:

Elite Publishing House International
A-10/28, Sector - 18, Rohini, New Delhi - 110089
Tele Info: 9289051518, 9289051519
Email: ephinternational@gmail.com, ephpublishers@gmail.com
Website: www.elitepublishing.in

Chapter - 2

Romantic Ecology in "The Hungry Tide" and "The God of Small Things": Exploring Nature's Role in Human Relationships

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Abstract

This research article delves into the concept of romantic ecology as portrayed in Amitav Ghosh's "The Hungry Tide" and Arundhati Roy's "The God of Small Things." These two novels offer intricate narratives that interweave human relationships and the environment, highlighting the symbiotic connection between nature and individuals. Drawing on ecocritical and postcolonial perspectives, this study explores how both authors utilize romantic ecological themes to address issues of identity, power dynamics, and social structures within the context of specific landscapes. By analyzing the characters' interactions with their surroundings, this article uncovers how nature acts as a catalyst for personal growth, liberation, and the reconfiguration of societal norms.

Introduction

The tapestry of literature throughout history has been interwoven with threads of nature's allure and its profound impact on human emotions and relationships. One of the most captivating and enduring themes in literary exploration is the interplay between the natural world and human experiences—a theme that often takes on the mantle of romantic ecology. This lens, which fuses the romanticization of nature with its entwining with human lives, offers a unique perspective through which

RESEARCH ARTICLE | JANUARY 24 2024

Role of isolated compounds from spices and herbs in natural medicinal care or therapy-A review

Archana M. Ramteke ✉; Pankaj B. Gourand; Sanjay M. Malode

AIP Conf. Proc. 2974, 030001 (2024)
https://doi.org/10.1063/5.0183505

Role of Isolated Compounds from Spices and Herbs in Natural Medicinal Care or Therapy- A Review

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Abstract. Spices and Herbs have a long history of medicinal uses. It includes turmeric, basil, mace, cinnamon, ginger, etc. [1]. Spices are not only used in India as well as in other countries right from the kitchen and medicinal uses in homes. Spice is a seed, fruit, root, bark or other plant substance primarily used for coloring, flavoring and preserving food. Herbs are the leaves, flowers and stem from plants used for flavoring, or as garnishing. Medicinal and aromatic plants have also been used therapeutically to improve the health and well-being of animals, most were given for prophylactic purposes and to improve growth rate and feed conversion ratio efficiency [2, 3]. The alternatives to antibiotics as growth stimulators from the group of prebiotics, probiotics, organic acids, essential oils, medicinal plants, or parts of plants such as thyme, basil, oregano, pepper, and plenty of others are numerous [2]. This chapter includes a wide variety of isolated compounds such as phenolic compounds and flavonoids present in spices are now experimentally documented to possess antioxidant, anti-inflammatory, anti-mutagenic, and anti-carcinogenic activities. It also includes a list of spices compounds that are experimentally evidenced to control cardiovascular diseases, diabetes, cataract, cancer, etc.

INTRODUCTION

Spices and herbs are an important part of the human diet to enhance the flavor, color, and aroma of food. They have also been used from ancient times as a traditional medicine to improve the health of animals. Spices and herbs can be classified based on flavor, taxonomy, or part of a plant from where they came. Presently there has been a trend to use natural substances present in fruits, vegetables, oil seeds, and herbs as antioxidants and rational foods [4, 5, 6]. According to the World Health Organization (WHO), essentially 20,000 medicinal plants reside in 91 countries. The premier steps to make use of the biologically active Phytochemicals from plant resources are extraction, pharmacological screening, isolation and characterization of the bioactive compound, toxicological analysis, and clinical evaluation [7]. A brief summary of the general approaches in extraction, isolation, and characterization of bioactive compounds from plant extract is presented in Figure1.

2nd International Conference on the "Multidimensional Role of Basic Science in Advanced Technology"
AIP Conf. Proc. 2974, 030001-1–030001-9; https://doi.org/10.1063/5.0183505
Published by AIP Publishing. 978-0-7354-4771-4/$30.00

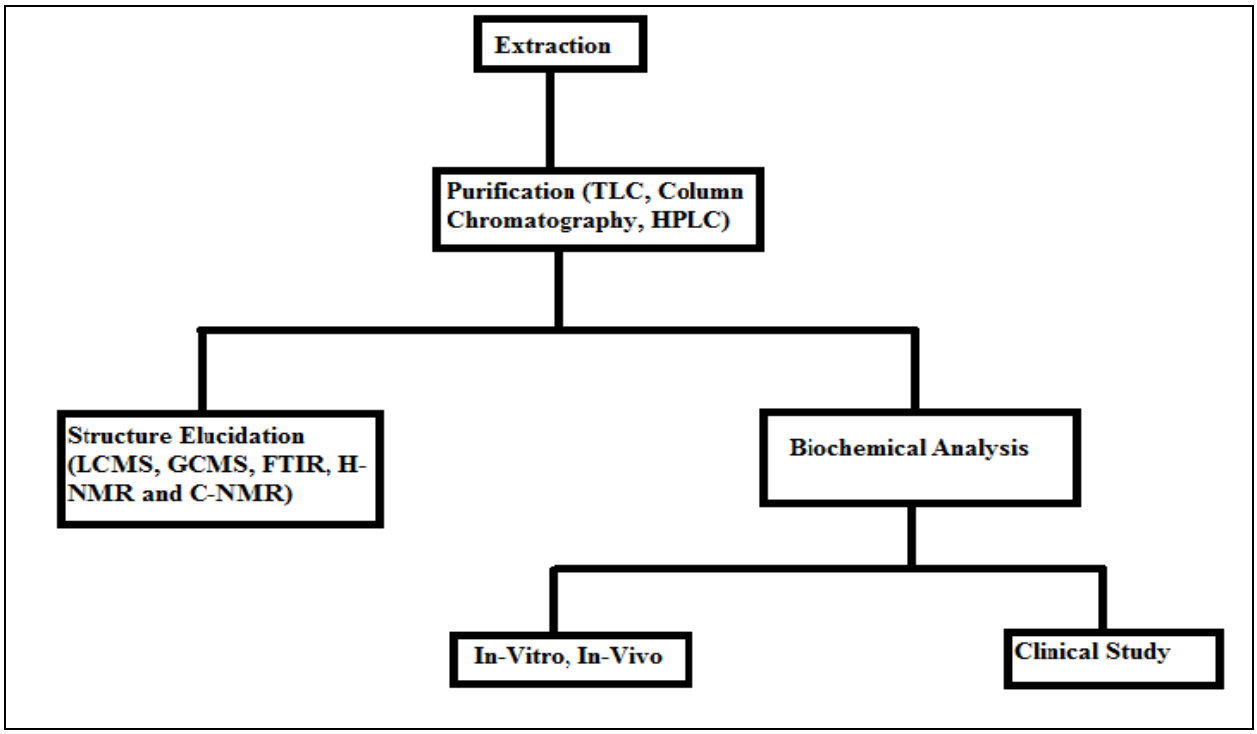

FIGURE 1. Brief summary of the general approaches in extraction, isolation, and characterization of a bioactive compound from plant extracts [8].

Spices and herbs are found to be rich sources of phytochemicals [9, 10, 11, 12]. Phytochemicals are a large group of bioactive derived from plants which have potential protective effects against diseases. This group consists of flavonoids and other phenolic compounds, carotenoids, plant sterols, glucosinolates and other sulphur-containing compounds. There are more than 6000 known flavonoids (Jaganath & Crozier, 2010). Phenolic compounds have various functions in the plant such as structural, defense, as attractants for pollinators and seed-dispersing animals.

Differences Between Spices And Herbs

Spices come from different parts of a plant other than the leaves while herbs come from leaves of a plant. They can be classified into various groups based on taste, taxonomy or part of the plant where they came from.

Based on taste, spices and herbs can be classified into groups:

a) Hot spices (black and white peppers, Cayenne pepper, mustard, chillies).

b) Mild flavour spices (paprika, coriander), aromatic spices (clove, cumin, dill fennel, nutmeg, mace, cinnamon) and

c) Aromatic herbs and vegetables like thyme, basil, onion, garlic etc.

Uses And Benefits Of Spices

TABLE 1. List of Important Spices with its Uses and Benefits [13, 14, 15].

Spices	Uses	Benefits
Asafoetida (Hing)	It is used for seasoning food and has medicinal uses	It can be used as good remedy for whooping cough and stomach ache.
Cardamom (Elaichi)	It give a good flavor and smell. It is also used widely in pharmaceutical sector.	It helps to control bad breath and digestive disorder. Also a whole cardamom chewed is good for Diabetes.
Chilly (Lal Mirch)	It is a main ingredient used for adding hot flavor to the food.	The antioxidants present in chilly help to cope up with cholesterol and also it helps in burning calories.
Cinnamon (*Dalchini*)	It is used mainly for seasoning food and preparing masala. It has medicinal value too.	It supports natural production of insulin and reduces blood cholesterol.
Clove (Laung)	It is mainly used as a cooking ingredient for seasoning food or preparing masala.	Clove oil is beneficial for coping with tooth ache, sore gums, chest pains, fever, digestive problems, cough and cold.
Coriander (Dhaniya)	Coriander leaves as well as coriander seeds are used in cooking. It also has some medicinal uses.	It can be used on aching joints and rheumatism. It is also good for coping with sore throat, allergies, digestion problems, fever etc.
Cumin (Zeera)	It is used for cooking and it also possesses medicinal properties.	It is a good source of iron and keeps immune system healthy. Water boiled with cumin seeds is good for dysentery.
Curry leaves (*Curry Patta*)	It is used as a main ingredient for seasoning in some countries. It has many medicinal uses.	These leaves are beneficial for reducing blood sugar. Each part of the plant provides some benefit or the other.
Fenugreek (*Methi*)	It is mainly used as a green leafy vegetable and seeds are used for seasoning and preparing *Masalas*. It has medicinal uses too.	Fenugreek seed tea or sweet fudge is good for increasing breast milk. It is also helpful for treating diabetes and lowering cholesterol.
Garlic (*Lassan*)	It is used for cooking as well as for the medicinal purpose.	It is useful for coping with cough and cold. It also has antibiotic properties.
Ginger (Adrak)	It is used for giving a specific flavor to food and has many medicinal uses.	Helps to avoid digestive problems. It is beneficial for coping with cough and cold.
Mustard (Rye)	It is used for seasoning as well as green leafy vegetable. The use of mustard oil is extensive in India but it is banned in some countries.	Mustard oil is good for body massage and even for getting good hair. It consists of omega-3 fatty acids. It is an excellent source of iron, zinc, manganese, calcium, protein etc.
Nutmeg (Jaiphal)	It is used in powdered form for garnishing and preparing the masala. It is used in making soaps, perfumes, and shampoos. It is also used for medicinal purposes.	It is beneficial for the treatments of asthma, heart disorder and bad breath problems.
Pepper (*Kaali Mirch*)	It is extensively used in cooking, especially for garnishing. It has many medicinal uses too.	It helps to deal with cold, cough, infections, muscle pains, and digestive problems.
Saffron (Zaffran/Kesar)	It is used for cooking as well as in beauty products. It is mainly used in sweet dishes. It has good medicinal properties.	It helps to cope with skin diseases. It is a good remedy for cough, cold, and asthma.
Star anise (Chakra Phool)	It is used in cooking and for medicinal use.	Star anise oil is beneficial for rheumatism, digestion, and avoiding bad breath.
Turmeric (Haldi)	It is used in cooking and skin care products. It has wide range of medicinal use.	It helps to deal with skin problems, healing cuts and wounds. Also, it makes coping with diabetes easier.

CHEMICAL COMPOUNDS IN HERBS AND SPICES

Anise

Anise is a seed spice derived from a flowering plant belonging to the family *Apiaceae*. Flavor and aroma from anise comes from anethole. Anethole is a phenylpropene derivative found in anise (*Pimpinella anisum*) and fennel (*Foeniculum vulgare*). Anethole occurs naturally in high concentrations in volatile oils such as anise oil (80–90%), star anise oil (over 90%), and fennel oil (80%) [16]. Anethole exists in both a *cis* and a *trans* isomer with the *trans* isomer being more abundant. It is the main component of the anise essential oil (80–90%), with minor components including para-anisaldehyde, estragole, and pseudoisoeugenyl-2-methylbutyrates, among others [17]. Anethole is also used in medicines as an expectorant, an antitussive and an antispasmodic for treating gastrointestinal tract illnesses. As a result, anise is found in a number of pharmaceutical products.

Basil

Basil (*Ocimum basilicum*) is a culinary herb belonging to the botanical family *Lamiaceae*. It has been used traditionally as a medicinal herb in the treatment of headaches, coughs, diarrhea, constipation, warts, worms, and kidney disorders. It is also a source of aroma compounds and essential oils containing biologically active constituents that possess antimicrobial and antifungal properties [18, 19]. Linalool is the main constituent of the essential oil of *O. basilicum* (28.6–60.6%), followed by estragole, methyl cinnamate, epi-α-cadinol, α-bergamotene, γ-cadinene (3.3–5.4%), germacrene D (1.1–3.3%), and camphor (1.1–3.1%). Other compounds such as myrcene, pinene, terpineol, 1,8-cineole, eugenol, and methyleugenol have been identified in basil leaves[20].

Chili pepper

The chili pepper is a fruit spice derived from plants from the genus *Capsicum*, originated in Mexico and brought to Asia by Portuguese navigators during the sixteenth century. Chili peppers are used as food colorants, flavoring agents, as predator repellants, and a source of pain relief. The compounds responsible for the "hot" flavor of chili peppers are called capsaicinoids, with capsaicin being the best known. *Capsicum* contains up to 1.5% (by weight) of pungent compounds, commonly composed of capsaicin, dihydrocapsaicin, and others. Other constituents present in chili peppers are carotenoids, vitamins A, C, and small amounts of volatile oils with more than 125 known components. Another class of capsaicin-like compounds found in chili peppers and non-pungent chili peppers are capsinoids. Many positive health benefits have been ascribed to both capsaicin and capsinoids, including anticancer, anti-inflammatory, and analgesic effects [21].

Cinnamon

Cinnamon is a bark spice obtained from the inner bark of several tree species from the genus *Cinnamomum*. Cinnamon is native to India, Sri Lanka, Bangladesh, and Myanmar, and it was imported to Egypt as early as 4000 years ago [22]. In addition to its common culinary use as a condiment and flavoring material, cinnamon is widely known for its anti-diabetic and glucose-lowering effects [23]. The flavor of cinnamon is due to an aromatic essential oil that is largely composed of cinnamaldehyde (up to 90%); however, there are at least 80 other compounds known to be in cinnamon oil, including cinnamyl alcohol, cinnamyl acetate, eugenol, and various coumarins that contribute to its overall flavor and aroma [24].

Ginger

Ginger (*Zingiber officinale*) is a root or rhizome-based spice derived from the ginger plant, a member of the turmeric family (both are from *Zingiberaceae*). Ginger is believed to have originated in India and is widely used as a culinary additive as a hot, fragrant spice as well as a popular medicine. In addition to ginger's well-known use as a treatment for nausea, many components in ginger have been found to have anti-inflammatory, antibacterial, antipyretic, anti-lipidemic, anti-tumorigenic, and anti-angiogenic effects [25, 26]. A variety of active components have been identified in the oleoresins of ginger including zingerone, gingerols (6-, 8-, and 10-gingerols), and

shogaols (6-, 8-, and 10-shogaols) [27]. Gingerols (especially 6-gingerol) are the major pungent components in the fresh ginger rhizome.

Nutmeg

Nutmeg is a fragrant flavoring spice coming from the seed of *Myristica fragrans (*belonging to the *Myristicaceae* family*),* an evergreen tree indigenous to the Banda Islands in the Moluccas (or Spice Islands) of Indonesia. The nutmeg essential oil is obtained by steam distillation of ground nutmeg, and it is used widely in the perfumery and pharmaceutical industries. This volatile fraction typically contains sabinene (21.38%), 4-terpineol (13.92%), and myristicin (13.57%), as well as portions of safrole, elimicin, terpineol, α-pinene d-camphene, limonene, linalool, and isoeugeunol [28].

Paprika

Paprika is a ground spice made from the red, air-dried fruits of the larger and sweeter varieties of the plant *Capsicum annuum*, which is also called bell pepper or sweet pepper. Paprika can also be modified with the addition of more pungent chili peppers and cayenne pepper. The red, orange, or yellow color of paprika is due to its content of carotenoids. Paprika carotenoids, particularly capsanthin and capsorubin, have been reported to have a strong antioxidant activity [29]. Based on these results, cucurbitaxanthin A, capsanthin, capsanthone, and cryptocapsin could be potential paprika-specific carotenoid biomarkers. However, further analyses using untargeted MS-based approaches should be conducted to evaluate other possible biomarkers of paprika intake.

Parsley

Parsley (*Petroselinum crispum*) is an herb belonging to the *Apiaceae* family. It is native to the central Mediterranean region. Fresh parsley has a clean, green aroma with a versatile fresh taste that is slightly peppery with an after taste of green apple. Parsley is a source of several flavonoids, especially luteolin and apigenin [30]. Apigenin is associated with anti-inflammatory activities as it appears to downregulate or inhibits cyclo-oxygenoase-2 (COX-2). Apigenin has also been identified as a potential cancer chemopreventive agent [31]. The major essential oil found in parsley leaves is 1, 3, 8-*p*-menthatriene, but other components are also present in lesser amounts including myristicin and limonene, among others [32, 33].

Peppermint

Peppermint and spearmint are herbs that belong to the *Laminacea* family. Spearmint (*Mentha spicata*) is believed to be the oldest of the mints. The active constituents of spearmint include spearmint oil, various flavonoids (diosmin, diosmetin), phenolic acids, and lignans. The most abundant compound in spearmint oil is carvone, which gives spearmint its distinctive smell. Peppermint has a high menthol content (40.7%), along with menthone (23.4%), and other essential oils such as menthyl acetate (4.2%), 1,8-cineole (5.3%), limonene (2.6%), menthofuran (3.7%), and β-caryophyllene (1.7%) [34]. Peppermint also contains terpenoids and flavonoids such as eriocitrin, hesperidin, and kaempferol 7-O-rutinoside.

Saffron

Saffron is among the world's most costly spices. It comes from the dried flower stigma of *Crocus sativus*. Saffron contains more than 150 volatile and aroma-yielding compounds. Safranal(2,6,6-trimethyl-1,3-cyclohexadiene-1-carboxaldehyde) is the major compound (70%) in the volatile fraction of saffron [35]. Saffron also has a number of non-volatile active components many of which are carotenoids, including zeaxanthin, lycopene, and various α- and β-carotenes. However, the golden yellow-orange color of saffron is primarily the result of the carotenoid α-crocin, a glycosylester of crocetin. Picrocrocin(4-(β-d-glucopyranosyloxy)-2,6,6-trimethyl-1-cyclohexene-1-carboxaldehyde) has also been found in saffron spice from 0.8 to 26.6% on a dry basis. This compound is responsible for saffron's bitter taste. In addition, saffron contains two important vitamins: riboflavin

and thiamine. Saffron extracts and tinctures have been used as antispasmodic agents, gingival sedatives, nerve sedatives, expectorants, stimulants, and aphrodisiacs.

Sage

Sage or *Salvia officinalis* is a medicinal plant belonging to the *Lamiaceae* family. Sage has been used in traditional medicine for the treatment of seizures, ulcers, gout, rheumatism, inflammation, dizziness, tremors, paralysis, diarrhea, and hyperglycemia [36]. Sage has a savory, slightly peppery flavor. It is strongly aromatic, and is characterized by a medicinal, lemony, or bitter taste. It is used for seasoning and flavoring in many different foods including sausages and stuffing. The major components present in sage are α-thujone (11.55–19.23%), viridiflorol (9.94–19.46%), 1, 8-cineole (8.85–15.60%), camphor (5.08–15.06%), manool (5.52–13.06%), β-caryophyllene (2.63–9.24%), α-humulene (1.93–8.94%), and β-thujone (5.45–6.17%) [37]. Some of the major phenolic compounds found in sage are rosmarinic acid, caffeic acid, carnosol, and carnosic acid.

Tarragon

Tarragon (*Artemisia dracunculus*), also known as estragon, is a perennial herb belonging to the *Asteraceae* (daisy) family. It is widespread across much of Eurasia and North America, and is cultivated for culinary and medicinal purposes. In vitro pharmacological studies indicate that tarragon has antibacterial, antifungal, and antiplatelet activity [38]. In vivo pharmacological studies have shown that tarragon has anti-inflammatory, hepatoprotective, antihyperglycemic, and antioxidant activity. The major components of Russian tarragon are reported to be terpinen-4-ol, sabinene, and elemicin. Methyleugenol and estragole are usually present in tarragon oils at about 10 and 3%, respectively. However, estragole is one of the predominant compounds in the essential oil of French tarragon, constituting up to 82% [38]. *Trans*-anethole (21.1%), α-trans-ocimene (20.6%), limonene (12.4%), α-pinene (5.1%), and allo-ocimene (4.8%) are the other main components of tarragon.

Turmeric

Turmeric is a rhizomatous herbaceous perennial plant (*Curcuma longa*) belonging to the ginger family, *Zingiberaceae.* It is a key ingredient in many Asian dishes and is used mainly as a coloring agent. The most notable phytochemical components of turmeric root include compounds called curcuminoids, such as curcumin (diferuloylmethane), demethoxycurcumin (DMC), and bisdemethoxycurcumin (BDMC). Curcumin is a polyphenolic molecule that constitutes 3.14% (on average) of powdered turmeric Curcumin is what gives the spice its yellow color [39]. The rhizome oils of turmeric contain more than 40 identifiable compounds, with the major constituents being α-turmerone (30–32%), aromatic-turmerone (17–26%), and β-turmerone (15–18%). This interest is likely due to the multiple biological or health activities attributed to it, including antioxidant, anti-inflammatory, and anti-tumor activities. Recent clinical studies with curcumin have demonstrated additional health benefits relating to treating immune deficiencies, improving cardiovascular health, treating depression [40], combating Alzheimer's disease, treating diabetes, arthritis, and inflammatory bowel disease [41].

Oregano, Rosemary and Thyme

Oregano, rosemary and thyme are well known for their beneficial health properties. For example, carnosic acid and some of the diterpenes abundant in rosemary and sage appear to exert anti-obesity effects (including body weight and lipid-lowering effects) [42]. Several compounds found in herbs from the *Laminaceae* family also exhibit antimicrobial activity, such as thymol, carvacrol, carnosol, rosmanol, and caffeic acid [43]. Oregano also contains polyphenols, including caffeic, *p*-coumaric, and rosmarinic acid, which confer antioxidant activity and prevents lipid peroxidation [44].

Rosemary (*Rosmarinus officinalis*) is native to the Mediterranean and Asia. The leaves are used as a flavoring agent in a variety of foods in traditional Mediterranean cuisine. They have a bitter, astringent taste, and a very characteristic aroma. Rosemary contains a number of phytochemicals, including rosmarinic acid, camphor, caffeic acid, ursolic acid, betulinic acid, carnosic acid, and carnosol [44]. Major essential oils present in rosemary oil are borneol (26.5%), α-terpinene (15.6%), and α-pinene (12.7%).

Thyme (*Thymus vulgaris*) is also a member of the *Lamiaceae* family, and it has been used in foods mainly for flavor, aroma, and food preservation. Thyme has also been used in folk medicine since the times of the ancient Egyptians, Greeks, and Romans. The leafy parts of thyme are often added to meat, fish, and food products and also used as herbal medicinal products. The essential oils of common thyme contain 20–58% thymol and *p*-cymene (15–28%) as the most prevalent compounds, followed by linalool (0.7–6.5%), γ-terpinene (4–10%), carvacrol (1–4%), myrcene (1–3%), 1,8-cineole (0.8%), and borneol (0.7–1.7%) [45]. Thymol is the compound that provides the distinct flavor of thyme. It is also found in oregano and is used as one of many additives in cigarettes.

CONCLUSION

Spices and herbs have been used since the early days of humankind and are still used throughout the world for health promotion and treatment of various diseases. Plants are found to be the source of today's modern medicine and contribute largely to the commercial drug preparation.

However, in many developing countries, herbal medicine is used as traditional medicine. Interests in food compounds from spices and herbs will continue to increase research and technologies which will develop better ways of growing spices and herbs that contain higher amounts of antioxidants. Present study shows several bioactive compounds have been isolated from various spices and herbs, which provides scientific and medicinal basis to include spices and herbs in our diet.

REFERENCES

1. R. Govindrajan, *et.al.* Antioxidant approach to disease management and the role of Rasayana' herbs of Ayurveda. Journal of Ethnopharmacology 2005, 99(2), pp. 165-178.
2. N. Puvaca, V. Stanacev, D. Glamocic, *et.al*. Beneficial effects of phytoadditives in broiler nutrition. World's Poultry Science Journal 2013, 69, pp. 27-34.
3. S. Popovic, N. Puvaca, L. J. Kostadinovic, et.al. Effects of dietary essential oils on productive performance, blood lipid profile, enzyme activity and immunological response of broiler chickens. European Poultry Science 2016, 80, pp. 1-12.
4. D. R. Farr, Functional foods. Can. Lett., 1997, 114, pp. 59-63.
5. H. Wang, G. Cao and R. L. Prior, Oxygen radical absorbing capacity of anthocyanins, J. Agric. Food Chem 1997, 45, pp. 304-309.
6. D. D. Kitts, A. N. Wijewickreme and C. Hu, Antioxidant properties of a North American ginseng extract. Mol. Cell. Biochem, 2000, 203, pp. 1-10.
7. J. Srivastava, J. Lambert and N. Vietmeyer, Medicinal plants: An expanding role in development, World Bank Technical Paper No. WTP 320, April 1996, pp. 1-36.
8. S. H. Ganatra and A. Ramteke, Studies of Anti-Cancer Activities Of Naturally Occurring Terpene Extracted From The Seeds Of Pithcellobium Dulce, INT INST Anticancer Research 2014, 34(12), pp. 7479-7480.
9. B. Shan, *et al*, Antioxidant capacity of 26 spice extracts and characterization of their phenolic constituents. Journal of Agricultural and Food Chemistry 2005, 53, pp. 7749-7759.
10. K. Srinivasan, Antioxidant potential of spices and their active constituents, Critical Reviews in Food Science and Nutrition 2014, 54, pp. 352-372.
11. Y. J. Surh, Anti-tumor promoting potential of selected spice ingredients with antioxidative and anti-inflammatory activities: A short review, Food and Chemical Toxicology: An International Journal Published for the British Industrial Biological Research Association 2002, 40, pp. 1091-1097.
12. W. Zheng and S. Y. Wang, Antioxidant activity and phenolic compounds in selected herbs, Journal of Agricultural and Food Chemistry, 2001, 49, pp. 5165-5170.
13. A. K. R. Sachan, S. Kumar, K. Kumari and D. Singh, Herbs and Spices- Biomarkers of Intake Based on Human Intervention Studies – A Systematic Review, Journal of Medicinal Plants Studies 2018, 6(3), pp. 116-122.
14. S. Dubey, Indian Spices and their Medicinal Value. Indian Journal of Pharmaceutical Education and Research, 2017, 51(3), pp. 330-332.
15. R. V. Fresno, et.al. Herbs and Spices- Biomarkers of Intake Based on Human Intervention Studies – A Systematic Review. Genes & Nutrition, 2019, 14.

16. V. Marinov, S. Valcheva- Kuzmanova, Review on the pharmacological activities of anethole, Scr Sci Pharm., 2015, 22, pp. 14–9.
17. V. M. Rodrigues, P. T. Rosa, M. O. Marques, A. J. Petenate, M. A. Meireles, Supercritical extraction of essential oil from aniseed (Pimpinella anisum L) using CO2: solubility, kinetics, and composition data. J Agric Food Chem., 2003, 516, pp. 1518–1523.
18. A. I. Hussain, F. Anwar, S. T. Hussain Sherazi and R. Przybylski, Chemical composition, antioxidant and antimicrobial activities of basil (Ocimum basilicum) essential oils depends on seasonal variations, Food Chem., 2008, 1083, pp. 986–995.
19. B. Wannissorn, S. Jarikasem, T. Siriwangchai, S. Thubthimthed, Antibacterial properties of essential oils from Thai medicinal plants, Fitoterapia, 2005, 762, pp. 233–6.
20. O. Politeo, M. Jukic, M. Milos, Chemical composition and antioxidant capacity of free volatile aglycones from basil (*Ocimum basilicum* L.) compared with its essential oil, Food Chem., 2007, 1011, pp. 379–385.
21. P. Chaiyata, S. Puttadechakum, S. Komindr, Effect of chili pepper (Capsicum frutescens) ingestion on plasma glucose response and metabolic rate in Thai women, J Med Assoc Thail., 2003, 869, pp. 854–860.
22. J. W. Parry, The story of spices, Econ Bot., 1955, 92, pp. 190–207.
23. A. Khan, M. Safdar, M. M. Ali Khan, K. N. Khattak, R. A. Anderson, Cinnamon improves glucose and lipids of people with type 2 diabetes, Diabetes Care, 2003, 2612, pp. 3215–8.
24. G. K. Jayaprakasha, L. J. Rao, Chemistry, biogenesis, and biological activities of Cinnamomum zeylanicum. Crit Rev Food Sci Nutr., 2011, 516, pp. 547–562.
25. Y. J. Surh, Anti-tumor promoting potential of selected spice ingredients with antioxidative and anti-inflammatory activities: a short review, Food Chem Toxicol, 2002, 408, pp. 1091–7.
26. M. Park, J. Bae, D. S. Lee, Antibacterial activity of [10]-gingerol and [12]-gingerol isolated from ginger rhizome against periodontal bacteria, Phytother Res., 2008, 2211, pp. 1446–9.
27. A. H. Rahmani, S. FMA, S. M. Aly, Active ingredients of ginger as potential candidates in the prevention and treatment of diseases via modulation of biological activities, Int J Physiol Pathophysiol Pharmacol. 2014, 62, pp. 125–136.
28. S. A. Muchtaridi, A. Apriyantono, R. Mustarichie, Identification of compounds in the essential oil of nutmeg seeds (*Myristica fragrans* Houtt.) that inhibit locomotor activity in mice, Int J Mol Sci., 2010, 1111, pp. 4771–81.
29. A. Nishino, H. Yasui, T. Maoka, Reaction of paprika carotenoids, Capsanthin and Capsorubin, with reactive oxygen species, J Agric Food Chem., 2016, 6423, pp. 4786–4792.
30. H. M. Maher, N. Z. Al-Zoman, M. M. Al-Shehri, Al-Showiman H, Al-Taweel AM, Fawzy GA, Perveen S. Determination of Luteolin and Apigenin in herbs by capillary electrophoresis with diode Array detection. Instrum Sci Technol, 2015, 436, pp. 611–625.
31. S. Shukla, S. Gupta, Apigenin: a promising molecule for cancer prevention. Pharm Res. 2010, 276, pp. 962–978.
32. S. Kokkini, R. Karousou, T. Lanaras, Essential oils of spearmint (Carvone-rich) plants from the island of Crete (Greece), Biochem Syst Ecol., 1995, 234, pp. 425–430.
33. H. Zhang, F. Chen, X. Wang, H. Y. Yao, Evaluation of antioxidant activity of parsley (Petroselinum crispum) essential oil and identification of its antioxidant constituents, Food Res Int., 2006, 39, pp. 833–839.
34. E. Schmidt, S. Bail, G. Buchbauer, I. Stoilova, T. Atanasova, A. Stoyanova, A. Krastanov, L. Jirovetz, Chemical composition, olfactory evaluation and antioxidant effects of essential oil from Mentha x piperita, Nat Prod Commun., 2009, 48, pp. 1107–1112.
35. L. Maggi, A. M. Sánchez, M. Carmona, C. D. Kanakis, E. Anastasaki, P. A. Tarantilis, M. G. Polissiou, G. L. Alonso, Rapid determination of safranal in the quality control of saffron spice (Crocus sativus L.), Food Chem., 2011, 1271, pp. 369–373.
36. A. Ghorbani, M. Esmaeilizadeh, Pharmacological properties of Salvia officinalis and its components, J Tradit Complement Med., 2017, 74, pp. 433–440.
37. M. Ben Farhat, M. J. Jordan, R. Chaouech-Hamada, A. Landoulsi, J. A. Sotomayor, Variations in essential oil, phenolic compounds, and antioxidant activity of tunisian cultivated Salvia officinalis L, J Agric Food Chem., 2009, 5721, pp. 10349–56.
38. D. Obolskiy, I. Pischel, B. Feistel, N. Glotov, M. Heinrich, L. Artemisia dracunculus, (tarragon): a critical review of its traditional use, chemical composition, pharmacology, and safety, J Agric Food Chem., 2011, 5921, pp. 11367–84.

39. L. Baum, S. K. Cheung, V. C. Mok, et al., Curcumin effects on blood lipid profile in a 6-month human study, Pharmacol Res., 2007, 566, pp. 509–514.
40. H. J. Seo, S. M. Wang, C. Han, S. J. Lee, A. A. Patkar, P. S. Masand, C. U. Pae, Curcumin as a putative antidepressant. Expert Rev Neurother, 2015, 153, pp. 269–280.
41. R. Sreedhar, S. Arumugam, R. A. Thandavarayan, V. Karuppagounder, K. Watanabe, Curcumin as a therapeutic agent in the chemoprevention of inflammatory bowel disease, Drug Discov Today, 2016, 215, pp. 843–9.
42. A. Ibarra, J. Cases, M. Roller, A. Chiralt-Boix, A. Coussaert, C. Ripoll, Carnosic acid-rich rosemary (Rosmarinus officinalis L.) leaf extract limits weight gain and improves cholesterol levels and glycaemia in mice on a high-fat diet, Br J Nutr., 2011, 1068, pp. 1182–1189.
43. P. K. Lai and J. Roy, Antimicrobial and chemo preventive properties of herbs and spices, Curr Med Chem. 2004, 1111, pp. 1451–1460.
44. A. Vallverdu Queralt, J. Regueiro, M. Martinez-Huelamo, J. F. Rinaldi Alvarenga, L. N. Leal, R. M. Lamuela Raventos, A comprehensive study on the phenolic profile of widely used culinary herbs and spices: rosemary, thyme, oregano, cinnamon, cumin and bay, Food Chem., 2014, 154, pp. 299–307.
45. M. Sokovic, J. Glamoclija, P. D. Marin, D. Brkic, L. J. Van Griensven, Antibacterial Effects of the Essential Oils of Commonly Consumed Medicinal Herbs Using an In Vitro Model, Molecules. 2010, pp. 1511-7532.




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Edition published in 22nd March, 2024
ISBN 13 : 978-81-19435-61-6

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Printed at Shri Gurudeo Printers, Amravati
Mahatma Fule Sankul, Shegaon Naka, V.M.V. Road, Amravati - 444603

₹ : 800/-

A Review of Two Deep Learning Models for Video Processing

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Abstract :

In this era when we are under watch every minute. A huge amount of video graphic data is generated every day. But extracting useful information from videos is a very tedious job. Recently Deep Learning techniques have gain quite a lot of interest of researchers. Convolution Neural Network algorithm have gained great height recently. A new branch of CNN named Deep CNN came into existence. Various pre trained models of Deep CNN are been created due to its ability of extracting features by its own and high accuracy in classification. This paper aims to reviews two Deep CNN model VGG16 and Inception(Google LenNet) which are widely used by the researchers for the task of video processing.

Keywords :

Video Processing, Machine Learning, Deep Learning.

1. Introduction :

Twenty first century is a fast-growing world. It is the era of ICT. With the fast advancement in technology, we are more surrounded by gadgets. A lot of ways have come into existence which can be used to capture videos. The video can be captured with the help of cameras, mobile phones, surveillance cameras, etc. So a huge amount of video data is generated. This caught the attention of the researchers and the major work has been concentrated on video processing. The previous decade can be called a decade of image processing. But this decade is moreover a decade of video processing.

A lot of work is going on in the field of video processing. The majority of the work has been focused on the task of action recognition, face recognition, emotion recognition, video summarization, etc. The list of the applications is never ending.

The video data is nothing but the continuous stream of frames. It majorly comprises two features that are spatial and temporal. This is often referred to as spatio-temporal features. Then traditional ways of extracting this feature was based on the handcrafted methods for feature extraction. Space time interest point (STIP), Scale Invariant Feature Transformation (SIFT), Motion Scale Invariant Feature Transform (MoSIFT) are some of the approaches to extract handcrafted features. Descriptors such as Histogram of Oriented Gradient (HOG), Histogram of optic Flow (HOF) were used for the Human Activity Recognition(HAR).

Modern techniques for video processing make use of Machine Learning algorithms. Convolution Neural Network CNN is found out to be very promising when it comes to image and video data. A lot of pre-trained models of CNN are available. This paper aims to review a few pre-trained models of CNN which can help to make a wise decision for further research in the field. Out of the available models this paper will review the VGG16 and Inception(GoogLeNet). These three are the widely and most commonly used pre-trained model of CNN when it comes to the task of video processing.

2. Literature Review :

Peipei Zhou et al. [1] A new input modality, image acceleration field is proposed to better extract the motion attributes. Firstly, each video is framed as RGB images. Secondly, the optical flow field is computed using the consecutive frames and acceleration field is obtained according to the optical flow field. Thirdly, the FightNet is trained with three kinds of input modalities, i.e., RGB images for spatial networks, optical flow images and acceleration images for temporal networks. By fusing results from different inputs, they conclude whether a video tells a violent event or not. To provide researchers a common ground for comparison, they have collected a violent interaction dataset (VID), containing 2314 videos with 1077 fight ones and 1237 no-fight ones. By comparison with other algorithms, experimental results demonstrate that the proposed model for violent interaction detection shows higher accuracy and better robustness.

Heyam M. Bin Jahlan et al. [2] work proposed a novel method to detect violence using a fusion technique of two significantly different convolutional neural networks

(CNNs) which are AlexNet and SqueezeNet networks. Each network followed by separate Convolution Long Short Term memory (ConvLSTM) to extract robust and richer features from a video in the final hidden state. Then, making a fusion of these two obtained states and fed to the max-pooling layer. Finally, features were classified using a series of fully connected layers and softmax classifier. The performance of the proposed method is evaluated using three standard benchmark datasets in terms of detec-tion accuracy: Hockey Fight dataset, Movie dataset and Violent Flow dataset. The results show an accuracy of 97%, 100%, and 96% respectively. A compari-son of the results with the state of the art techniques revealed the promising ca-pability of the proposed method in recognizing violent videos.

Irfanullah et al.[3] In their research, multiple key challenges have been oncorporated with the existing work and the proposed work contrast. Firstly, violent objects can't be defined manually and then the system needs to deal with the uncertainty. The second step is the availability of label dataset because manually annotation video is an expensive and laborintensive task. There is no such approach for violence detection with low computation and high accuracy in surveillance environments so far. The Convolutional Neural Network's (CNN) models have been evaluated with the proposed MobileNet model. The MobileNet model has been contrasted with AlexNet, VGG-16, and GoogleNet models. The simulations have been executed using Python from which the accuracy of AlexNet is 88.99 and the loss is 2.480 (%). The accuracy of VGG-16 is 96.49 and loss is 0.1669, the accuracy of GoogleNet is 94.99 and loss is 2.92416 (%). The proposed MobileNet model accuracy is 96.66 and loss is 0.1329 (%). The proposed MobileNet model has shown outstanding performance in the perspective of accuracy, loss, and computation time on the hockey fight dataset.

Shakil Ahmed Sumon et al. [4] have explored different strategies to find out the saliency of the features from different pretrained models in detecting violence in videos. A dataset is created which consist of violent and non-violent videos of different settings. Three Image Net models; VGG16, VGG19, ResNet50 are being used to extract features from the frames of the videos. In one of the experiments, the extracted features have been feed into a fully connected network which detect violence in frame level. In another experiment, they had fed the extracted features of 30 frames to a long short-term memory (LSTM) network at a time. Furthermore, they applied attention to the features extracted from the frames through spatial transformer network which also enables transformations like rotation, translation and scale. Along with these models, they designed a custom convolutional neural network (CNN) as a feature extractor and a pretrained model which is initially trained on a movie violence dataset. In the end, the features extracted from the ResNet50 pretrained model proved to be more salient towards detecting violence. These ResNet50 features, in combination with LSTM provide an accuracy of 97.06% which is better than the other models we have experimented with.

Narges Honarjoo et al. [5] employed pre-trained deep neural networks in order to present a low-complexity method for violence detection. The extracted features from pre-trained models have been pooled and fed into a fully connected network in order to detect whether a violent action has occurred. As pre-trained models, the results of both ResNet-50 and VGG16 are explored in the proposed approach. They evaluate the effectiveness of the method on four public datasets. The experimental results depict the efficiency of the low-complexity proposed approach in comparison with other approaches using time-consuming networks like recurrent ones.

3. Algorithms :

3.1 VGG 16 :

It is a pre-trained model with 3 x 3 filter for convolution layer and 1 stride. It uses 2 x 2 filters and 2 stride for max pooling layer. Same configuration is used for padding also. It does not use any hyper parameter but consists of this simple arrangement. In VGG 16 this arrangement is consistent throughout the architecture. At the end of the architecture there are two fully connected layers which are followed by the softmax function for output. There are all 16 layers in this Deep learning model hence it is called VGG 16. This layer can be extended up to 19 layers which builds the architecture of VGG19. It takes the input from three RGB channels with the size pf 244 x 244. The total no of filters in Convolution layer 1 is 64, layer 2 is 128, layer 3 is 256, and layer 4 and 5 have 512 filters.

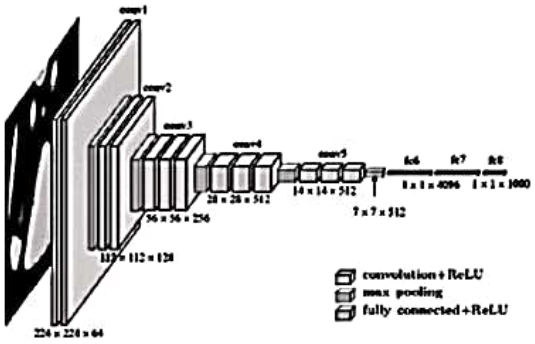

Fig.1 : The standard VGG-16 network architecture as proposed in [6].

The fully connected layers have 4096 and 4096 nodes respectively. The softmax consists of 1000 nodes.

This model is best suited when less training time is required. As it has very few parameters it takes very less time for training while giving quite impressive results.

3.2 Inception (GoogLeNet) :

Another Deep Learning model of CNN is Inception which is proposed by Google. This architecture is total 27 layers deep. It is based on the idea of a sparsely connected network. This architecture consists of convolution layer, followed by a max pooling layer, inception, avg pool, dropout, liner and lastly a softmax function. There are 2 convolution layers, 4 max pool layers, and 9 inception layers which is followed by a dropout, avg pool, linear and a softmax layer. Which makes this architecture huge. The Inception layer is the combination of 1 x 1 convolution layer, 3 x 3 convolution layer, 5 x 5 convolution layer with the output filter to create an image which in turns acts as an input to the next layer of the architecture.

The Inception requires a lot of space as it has this huge architecture. The variable type features need to be extracted by different sizes of kernel. This is rightly done by Inception. It got a small to large kernel implemented in one layer which are perfectly suited for this task.

type	patch size/ stride	output size	depth	#1×1	#3×3 reduce	#3×3	#5×5 reduce	#5×5	pool proj	params	ops
convolution	7×7/2	112×112×64	1							2.7K	34M
max pool	3×3/2	56×56×64	0								
convolution	3×3/1	56×56×192	2		64	192				112K	360M
max pool	3×3/2	28×28×192	0								
inception (3a)		28×28×256	2	64	96	128	16	32	32	159K	128M
inception (3b)		28×28×480	2	128	128	192	32	96	64	380K	304M
max pool	3×3/2	14×14×480	0								
inception (4a)		14×14×512	2	192	96	208	16	48	64	364K	73M
inception (4b)		14×14×512	2	160	112	224	24	64	64	437K	88M
inception (4c)		14×14×512	2	128	128	256	24	64	64	463K	100M
inception (4d)		14×14×528	2	112	144	288	32	64	64	580K	119M
inception (4e)		14×14×832	2	256	160	320	32	128	128	840K	170M
max pool	3×3/2	7×7×832	0								
inception (5a)		7×7×832	2	256	160	320	32	128	128	1072K	54M
inception (5b)		7×7×1024	2	384	192	384	48	128	128	1388K	71M
avg pool	7×7/1	1×1×1024	0								
dropout (40%)		1×1×1024	0								
linear		1×1×1000	1							1000K	1M
softmax		1×1×1000	0								

Table 1 : GoogLeNet incarnation of the Inception architecture.[7]

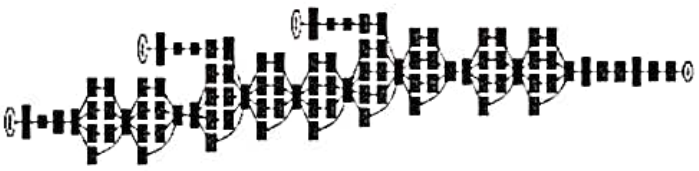

Fig. 2 : GoogLeNet network with all the bells and whistles.[7]

Fig. 3 : Inception module with dimensionality reduction and Inception module, naive version[7]

Conclusion :

In this paper we have reviewed two greatly used pre-trained models of CNN which are used in deep learning. It has been observed that the VGG 16 or VGG 19 (the architecture with 19 layers) requires comparatively less parameters to trains and as a result it takes less time to get trained. The Inception pre-trained CNN is a deep architecture of 27 layers. When it comes to the extraction of variable type features the Inceptions is the best choice as it got multiple kernels of different size built in a single layer. But it requires a good amount of space and takes time to get trained.

References :

1. Zhou, Peipei, et al. "Violent interaction detection in video based on deep learning." Journal of physics: conference series. Vol. 844. No. 1. IOP Publishing, 2017.
2. Jahlan, Heyam M. Bin, and Lamiaa A. Elrefaei. "Detecting Violence in Video Based on Deep Features Fusion Technique." arXiv preprint arXiv:2204.07443 (2022).
3. Irfanullah, Hussain, T., Iqbal, A. et al. Real time violence detection in surveillance videos using Convolutional Neural Networks. Multimed Tools Appl 81, 38151–38173 (2022). https://doi.org/10.1007/s11042-022-13169-4
4. Sumon, Shakil Ahmed, et al. "Violence detection by pretrained modules with different deep learning approaches." Vietnam Journal of Computer Science 7.01 (2020): 19-40.
5. Honarjoo, Narges, Ali Abdari, and AzadehMansouri. "Violence detection using pre-trained models. "2021 5th International Conference on Pattern Recognition and Image Analysis (IPRIA). IEEE, 2021.
6. K. Simonyan and A. Zisserman, "Very deep convolutional networks for large-scale image recognition," arXiv preprint arXiv:1409.1556, 2014.
7. C. Szegedy et al., "Going deeper with convolutions", 2015 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Boston, MA, USA, 2015, pp. 1-9, doi: 10.1109/CVPR.2015.7298594.

8. P. Sernani, N. Falcionelli, S. Tomassini, P. Contardo and A. F. Dragoni, "Deep Learning for Automatic Violence Detection: Tests on the AIRTLab Dataset," in IEEE Access, vol. 9, pp. 160580-160595, 2021, doi: 10.1109/ACCESS.2021.3131315.
9. A. Karine, T. Napoléon, J. -Y. Mulot and Y. Auffret, "Video Seals Recognition using Transfer Learning of Convolutional Neural Network," 2020 Tenth International Conference on Image Processing Theory, Tools and Applications (IPTA), Paris, France, 2020, pp. 1-4, doi: 10.1109/IPTA50016.2020.9286702.
10. D. Kusumawati, A. A. Ilham, A. Achmad and I. Nurtanio, "Vgg-16 And Vgg-19 Architecture Models In Lie Detection Using Image Processing," 2022 6th International Conference on Information Technology, Information Systems and Electrical Engineering (ICITISEE), Yogyakarta, Indonesia, 2022, pp. 340-345, doi: 10.1109/ICITISEE57756.2022.10057748.
11. S. Jianjie and Z. Weijun, "Violence Detection Based on Three-Dimensional Convolutional Neural Network with Inception-ResNet," 2020 IEEE Conference on Telecommunications, Optics and Computer Science (TOCS), Shenyang, China, 2020, pp. 145-150, doi: 10.1109/TOCS50858.2020.9339755.
12. E. Sabu and K. Suresh, "Object Detection from Video Using Temporal Convolutional Network," 2018 IEEE Recent Advances in Intelligent Computational Systems (RAICS), Thiruvananthapuram, India, 2018, pp. 11-15, doi: 10.1109/RAICS.2018.8635089.
13. Z. Sun, P. Wang, J. Wang, X. Peng and Y. Jin, "Exploiting Deeply Supervised Inception Networks for Automatically Detecting Traffic Congestion on Freeway in China Using Ultra-Low Frame Rate Videos," in IEEE Access, vol. 8, pp. 21226-21235, 2020, doi: 10.1109/ACCESS.2020.2968597.

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Edition published in 22nd March, 2024

ISBN 13 : 978-81-19435-61-6

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Today's Challenges, Trends & Applications of Natural Language Processing (NLP)

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Abstract :

Natural language processing establish communication between humans and machines. It enables computers to understand human language makes interacting with computers much more intuitive for humans. It offers improved accuracy and efficiency of documentation. Enables an organization to use chatbots for customer support as well as make easier for organizations to perform sentiment analysis. An organization can use NLP to better understand social media posts, surveys and reviews also provides an organization with the ability to automatically make a readable summary of a larger, more complex original text. Natural language processing, or NLP, has garnered a lot of attention todays as a way to computationally represent and understand human language. Its uses have spread to a variety of sectors, including as machine translation, email spam identification, information extraction, summarization, and the medical field. This paper focuses on the trends, challenges and application in Natural Language Processing.

Keyword :

Natural Language Processing, Sentiment Analysis, Text Summarization, Reinforcement learning, Trends & Challenges.

Natural Language Processing:

These days, communicating using any language i.e. NATURAL LANGUAG is the primary requirement for understanding one another, whether it be on social media or in any other particular industry. A language may be defined as a set of integrated rules or symbols that are used to broadcast or transfer information. Since not all users are conversant in machine-specific language, natural language processing (NLP) helps users who don't have the time to learn new languages. Actually, training computers to understand words or phrases written in human languages is the goal of the artificial intelligence and linguistics fields of natural language processing (NLP). It was developed to facilitate natural language communication between people and computers and to make user job easier.

Natural language processing used for:

- **Text classification:** Text categorization function using tags, this function groups texts into categories. This can be useful for sentiment analysis, which helps the natural language processing algorithm determine the sentiment, or emotion, behind a text.
- **Text extraction :** This feature discovers key information in text and summaries it automatically. One example of this is keyword extraction, which pulls the most important words from the text, which can be useful for search engine optimization. This isn't entirely automated when using natural language processing, therefore some programming is needed.
- **Machine translation:** Machine translation in Natural Language Processing (NLP) has several benefits, including Improved communication. Machine translation makes it easier for people who speak different languages to communicate with each other, breaking down language barriers and facilitating international cooperation.
- **Natural Language Understanding :** NLU makes it possible for computers to comprehend natural language and analyze it by removing concepts, entities, emotions, keywords, and other elements. In customer service applications, it's utilized to comprehend issues that consumers report, either orally or in writing. The study of language meaning, language context, and language varieties is known as linguistics. Therefore, it is critical to comprehend the various NLP levels and key terms. Next, we go over a few terms that are frequently used at various NLP levels.
- **Natural language Generation :** The process of creating meaningful words, sentences, and paragraphs from an internal representation is known as natural language generation, or NLG. It is a component of natural language processing and comprises four stages: goal identification, goal planning (based on scenario analysis and available communication sources), goal realization as a text, and goal realization.

Natural Language Processing Trends:

- **Virtual Assistants :** Virtual assistants are becoming more and more popular in gadgets and software since they increase accessibility and offer information whenever needed. But only when the virtual assistants comprehend the question without misinterpreting it can they provide proper information. Startups are using natural language processing (NLP) to create innovative chatbots and virtual assistants. Unlike human virtual assistants, they reduce processing errors and operate continually. NLP-enabled virtual assistants are also useful for helping with academic research, informing manufacturing workers, and many other tasks.
- **Sentiment Analysis:** Text, video, and audio data are produced at exponential rates in our increasingly digitized environment. Natural language processors can digest vast amounts of data, but they are not able to distinguish between neutral, positive, or negative speech. Also, unlike normal NLP models, support agents can modify their dialogue with clients based on their emotional state during interactions. As a result, NLP models that comprehend both the context and the sentimental or emotional content of text data are being developed by entrepreneurs. These NLP models enhance consumer satisfaction and loyalty by providing superior products and experiences.

Multilingual Language Models:

There are approximately 7000 languages spoken in the globe, each with unique nuances, making communication extremely hard. Since the majority of natural language processors on the market today are English-only, they are either ineffective or do not serve other markets well. The creation of NLP models that correctly comprehend unstructured input in several languages is made possible by the availability of sizable training datasets in various languages. Businesses are able to accelerate their translation procedures, expand their brand reach, and improve data accessibility as a result.

Language Transformers:

Natural language solutions require massive language datasets to train processors. This training process deals with issues, like similar-sounding words, that affect the performance of NLP models. Language transformers avoid these by applying self-attention mechanisms to better understand the relationships between sequential elements. Moreover, this type of neural network architecture ensures that the weighted average calculation for each word is unique.

Transfer Learning :

Models cannot generalize what they learn from machine learning challenges since they are domain-specific in nature. This is problematic because, in contrast to training datasets, real-world data is primarily unstructured. This has an impact on the trained models' predictability as a result. Transfer learning, however, allows many language models to share a large portion of their training data in order to maximize the overall deep learning process. The time and expense required to train new natural language processing (NLP) models are greatly decreased by the use of transfer learning.

Text Summarization:

When it comes to interpreting vast amounts of data and comprehending spoken and written human language, natural language processors are incredibly effective. However, when evaluating huge text documents, standard NLP models are unable to distinguish between relevant and irrelevant information. Consequently, companies are using machine learning algorithms to create natural language processing (NLP) models that condense long texts into a coherent, flowing synopsis that includes all the important details. These language processors' primary advantages are the reduction in time required to dissect a document and the boost in output that results from rapid data summarization.

Semantic Search:

Search engines play a crucial role in digital information retrieval operations. Lack of knowledge about the context and intent of the supplied data is one of the obstacles to efficient searches. Semantic search queries that evaluate search intent are made possible by NLP. As a result, search results are more relevant and search accuracy is increased. Semantic search models are therefore useful in a variety of fields, including enterprise knowledge management, eCommerce, and academic research.

Reinforcement Learning:

Presently, NLP-based systems find it difficult to handle circumstances that fall outside of their purview. As a result, it takes a lot of effort to retrain AI models for every unique scenario that they are unable to handle. Through feedback from the environment, reinforcement learning helps NLP models learn how to behave in a way that increases the likelihood of a favorable result. This makes it possible for developers and companies to use a series of reward-based training rounds to continuously enhance the performance of their NLP models. Thus, these learning models enhance NLP-based applications, including chatbots, translation software, and healthcare software.

Natural Language Processing Applications:

- **NLP in the Marketing and Advertising Industry:** NLP helps in analyzing customer opinions and preferences through sentiment analysis. It extracts relevant keywords from customer reviews and feedback to recognize key themes. NLP uses topic modeling to identify emerging topics and customer interests. Named Entity Recognition helps identify brand mentions and influencers. Text classification categorizes customer feedback and queries are also done by NLP.
- **NLP Application in the Finance Industry:** NLP analyzes news and social media sentiments for stock market predictions. Text mining extracts pertinent data from financial reports of industry. Anomaly detection and clustering are used for fraud prevention. NLP-driven chatbots assist in customer service and support. NLP summarizes financial news for quick updates.
- **NLP Applications in Healthcare Industry:** NLP is used for analyzing and processing clinical documents. It aids in predicting diseases and planning treatments. NLP extracts information from medical records and research papers. Mining patient data supports population health management. NLP-driven chatbots assist and support patients.
- **NLP Applications in Human Resources:** NLP is used to analyze resumes for candidate matching. Feedback analysis aids in performance evaluation done by NLP. NLP monitors employee sentiment and engagement. NLP analyzes diversity in job postings also. NLP is applied to monitor compliance and assess risks.
- **NLP Applications in Education :** NLP automates the grading process. Personalized tutoring based on student needs is facilitated through NLP. NLP is used for analyzing textbooks and course materials. NLP helps in detecting and preventing plagiarism. NLP is applied to analyze student engagement and sentiment.
- **NLP Applications in E-Commerce and Retail :** NLP categorizes products for recommendation. Customer feedback is analyzed using NLP. NLP-driven chatbots provide customer support. NLP optimizes inventory and supply chain. NLP aids in detecting and preventing fraudulent activities.
- **NLP Applications in Customer Service:** NLP aids in understanding sentiments from customer feedback. Chatbots driven by NLP assist in handling customer inquiries. Call center voice data is analyzed using NLP. NLP helps in predicting customer behavior. Personalized product recommendations.

Challenges of natural language processing

- **Precision:** Traditionally, humans have had to communicate with computers using a restricted set of explicitly spoken voice instructions or a precise, unambiguous, highly organized programming language. Human speech, on the other hand, is frequently ambiguous and its linguistic structure can be influenced by a wide range of intricate factors, such as social context, regional dialects, and slang.
- **Tone of voice and inflection :** The field of natural language processing is still in its infancy. Semantic analysis, for instance, can still be difficult. The fact that abstract language use is sometimes difficult and sophisticated for programs to comprehend is another challenge. For example, sarcasm is difficult for natural language processing to understand. Understanding the terms being used and their context in a conversation is typically necessary for these issues. Furthermore, the word or syllable that the speaker emphasizes in a statement might alter its meaning. When recognizing speech, NLP algorithms may fail to pick up on minute but significant variations in a speaker's voice. Different accents might also differ in tone and intonation of speech, making it difficult for an algorithm to parse.
- **Evolving use of language :** The fact that language and how people use it is always evolving presents another problem for natural language processing. While there are norms in language, they are not set in stone and can change throughout time. With the changing nature of real-world language, hard computational principles that are currently effective may become outdated in the future.
- **Bias:** When the biases present in their training data are reflected in the NLP systems' processes, bias might arise. This is a problem since hiring practices and the medical industry may prejudice against an applicant.

Conclusion :

NLP is a recent area of research and application. NLP-based information access technologies will continue to be a major area of research and development in information systems now and far into the future.

- **Application:** The most popular applications of Natural Language Processing in this paper. NLP is used in many other areas such as social media monitoring, translation tools, smart home devices, survey analytics, etc. Also understood vast use of NLP in various application improving our daily lives.
- **Trends:** In this research paper we understood about current trends of Natural Language Processing in

many areas like virtual assistant, sentiment analysis, language transformers, reinforcement learning etc.

- **Challenges:** We conclude by discussing the future of NLP and the challenges that the field faces. We believe that NLP has the potential to revolutionize the way we interact with computers and the way we process information. However, there are also some challenges that need to be addressed, such as the lack of interpretability of NLP models and the need for more data.

References :

1. https://medium.com/@smdtechnosol/the-success-of-nlp-natural-language-processing-in-2024-c123d8341733
2. Diksha Khurana, Aditya Koli, Kiran Khatter, Sukhdev Singh (2022) Natural Language Processing : state of art, current trends and challenges
3. https://www.startus-insights.com/innovators-guide/natural-language-processing-trends/
4. Wang W, Gang J, 2018 Application of convolutional neural network in natural language processing.
5. https://www.ibm.com/topics/natural-language-processing
6. https://www.startus-insights.com/innovators-guide/natural-language-processing-trends/
7. Mariusz Kruk, A look at advanced learners' use of mobile devices for English language study: Insights from interview data
8. https://medium.com/@smdtechnosol/the-success-of-nlp-natural-language-processing-in-2024-c123d8341733.
9. Elizabeth D. Liddy, 2001 Natural Language Processing.

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Chief Editor
Dr. Pradnya S. Yenkar
Principal, Vidya Bharati Mahavidyalaya, Amravati

ISBN : 978-81-19931-25-5

Date : 10th Feb., 2024

Publisher :
Sai Jyoti Publication
Itwari, Nagpur
E-mail : sjp10ng@gmail.com

Type Setting & Printing
LASER POINT,
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Role of Biofertilizers In Sustainable Agriculture and an Environmental Development

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ABSTRACT
Producing healthy crops for the fulfilment of the demands of the world's growing population is fully dependent upon kind of of the fertilizers being used to provide the plants with all the important nutrients but more dependability on the chemical fertilizers is destroying the environmental ecology and negatively impacting the health of humans. Bio based fertilizers are basically the preprations of living cells or latent of efficient potential microbial strains that assist the plants in nutrient uptake by their associations in the rhizosphere region when supplied to the plants either through the seed or the soil .Thus using microbes as bio inoculants is believed to be the best substitute of chemical fertilizers as eco-friendly manner for plant growth and soil fertility.
KEYWORDS- Bio based fertilizers ; Environmental ; Microbial strains ; Soil fertility.

I-Introduction

The term Biofertilizers denotes nutrient inputs of plant growth which are biological origin .The Biofertilizer restore the soils natural nutrient cycle and build soil organic matter .The role of Biofertilizer in agriculture Production assumes Special significance particularly in the present context of expensive Chemical fertilizers. Moreever it can provide to the farmers a new strategy which is helpful for achieving the goal of increasing productivity. "Bio-Fertilizers refer to various inoculants or Cultures containing a specific microorganisms in concentrated form which are derived either from nodules of plant roots or from the soils of roots of Leguminous Plants or Non Symbiotically (free living) or to transfer native soil nutrients such as P,Zn, Cu, Fe,S etc. from the non usable (fixed) form to usable form through biological processes.".Biofertilizer is the need of modern agriculture since demand for safe and residue free food is increasing.Biofertilizer become popular to counter the negative impact of indiscriminate use of chemical fertilizers .Biofertilizers help in fixing atmoshpheric nitrogen, converting soil phosphate and potash into soluble forms to make them available to plants . Biofertilizers are selective microorganisms .They provide cost effective, eco-friendly and renewable source of nutrients.They improve the nutrient availability to the crops in which biological process is involved.

II- Scope and Importance of Biofertilizers

1.Permanent effect -Chemical fertilizers have temporary effect while Biofertilizers have permanent effect without any production problem.

2.Protection- Biofertilizers provide protection against drought and some soil born diseases.

3. Cheap – Biofertilizers are very cheap as compared to chemical fertilizers because raw material required for the growth of microorganism is very cheap. The infrastructure and equipment required for growth of microorganism is very cheap. Use of biofertilizers is economical with a high cost: benefit ratio, without risk.

4. Simple methods – The production method of Biofertilizer is very simple. It requires low investment, small space and less labour and equipment as compared to production method of chemical fertilizers. They can be manufactured in any simple microbiology laboratory.

5. Natural – Biofertilizers are natural. They are not foreign to the soil so they create no pollution problem.

6. **Biocontrol –** Few microorganisms used as biofertilizers also controls plant pathogens either developing mechanical barrier for entry of plant pathogens e.g. Mycorrhiza or produce antibiotics killing plant pathogens e.g. *Streptomyces*.

7. **Supply nutrient** – They may supply other nutrients and increase fertility of soil. The Azotobacter added in the soil for nitrogen fixation may have amylolytic or proteolytic activity thus Azotobacter also helps in development of humus.

8. **Prevents soil erosion** – Biofertilizers may prevent soil erossion. Many microbial inoculant may produce extra cellular, capsular polysaccharide which is viscous in nature. This viscous substance adheres to the soil particle and prevents erossion of soil

9. **Supply hormones and vitamins –** They may supply vitamins and plant growth hormones. Many microorganisms secretes auxins, ethylene, abscisic acid, cytokinin, pantothenic acid, indol acetic acid and gibberellin like substances which promote plant growth.

10. **Mobilizes immobilized nutrients –** Biofertilizers convert immobilized chemical fertilizers into soluble forms. Soluble inorganic phosphates lost in the soil due to chemical reactions in insoluble inorganic phosphate us again converted soluble phosphate by biofertilizer. Thus biofertilizer can act as a renewable supplement to chemical fertilizers and organic manures.

. **11. Provides essential elements and enzymes-** Biofertilizer provide essential elements like nitrogen, potash phosphorous, sulphur etc. by directly supplying them or transforming them into soluble form; in addition, they also helps plants to uptake several micronutrients. They supplies some important enzymes, hormones and antibiotics that enhance crop growth and crop yields.

12. **Protects from adverse environment -**Some biofertilizers protects plants against drought, high . temperature shock, high salinity etc.

III- Microbes used as Biofertilizers

III-Types of Biofertilizers

Broadly Biofertilizers are divided into seven main categories, these are again divided in subtypes as follow

B. Nitrogen Fixers

The process of converting atmospheric nitrogen into ammonia by the diazotrophic microbes is known as biological nitrogen fixation (BNF). BNF allows the replenishment of total nitrogen content and the fixed nitrogen regulates the crop growth and yield. Chemical fertilizers cause increased nitrogen oxide emission, water eutrophication and soil acidification. Whereas, biologically fixed nitrogen is sustainable and is less available for leaching and volatilization. Nitrogen fixation is more or less limited to bacteria and archaea, which forms a large portion of diazotrophic organisms. Nitrogen-fixing groups include green sulphur bacteria, firmibacteria, actinomycetes, cyanobacteria and all subdivisions of the proteobacteria. However, only methanogens are able to fix nitrogen among archaea. Different bacterial strains are able to carry out nitrogen fixation with different physiologies including: aerobic (for example, *Azotobacter*), anaerobic (*Clostridium*), facultatively anaerobic (*Klebsiella*) or heterotrophs; an oxygenic (*Rhodobacter*) or oxygenic (*Anabaena*)

i)Symbiotic nitrogen fixers – (symbiotic nitrogen fixers live in association with other plant) *Rhizobium, Azolla*. etc.

ii)Non Symbiotic nitrogen fixer –(Non symbiotic nitrogen fixers are free living forms) *Azotobacter, Azospirillum, Anabaena,Nostoc,Oscillatoria*,*Bacillus*,etc.

B. Phosphate Suppliers

Phosphorous is a vital macronutrient required for the growth and development of a plant. Usually, phosphorous exists in the form of tricalcium, dicalcium phosphate and minerals. The process of solubilization and mineralization in soil i.e., conversion of organic form of phosphate into inorganic form is carried out by phosphate-solubilizing bacteria . Mycorrhiza

also play crucial role in phosphorus mobilization, nutrient cycling and enhancement of microbial biomass. Generally, indigenous arbuscular mycorrhizae (AM) are found in soil, which colonizes the plant roots and stimulate plant growth. Inoculation of low phosphorous soil with mycorrhiza causes a sudden increase in availability of phosphorous.

i) Phosphate solubilising microorganisms – *Bacillus, Aspergillus, Pseudomonas*

ii) Phosphate absorber – V.A. mycorrhiza (**VAM** fungi)

C. Sulphur Suppliers

Sulphur is generally regarded as trace element in majority of crop plants. But this is one of the major elements in oilseed crops, some important vegetables (onion, oat, cauliflower etc.) and inn some spices (ginger, garlic etc.) it is important element. Sulphur essential for biochemical synthesis of some important glycosides, pungent compound and disease resistant properties. Soil is composed of organic as well as inorganic sulphur and the process of conversion of organic sulphur into plant utilizable inorganic sulphur (i.e., SO_4^{2-}) form is carried out by sulphur-oxidizing bacteria (SOB) including *Xanthobacter, Alcaligenes, Bacillus, Pseudomonas, Thiobacillus.*Deficiency of sulphur in agricultural soil could be corrected using sulphur oxididizing bacteria as boifertilizer

D. Potash solubilizing bacteria

Potassium is ranked at third position as crucial plant nutrient after nitrogen and Potassium is available in plentiful amount in the soil but only a small fraction (1–2%) of it is available to plants. Hence, a system of continuous replenishment of potassium in soil solution is needed for its adequate availability to crop plants Like other nutrients, potassium also influences growth and development of plants. . In deficiency of potassium, root growth becomes slow and gets poorly developed, seeds will be of small size and disease susceptibility will be more leading to reduction in crop yield PGPRs present in the soil and rhizosphere convert the potassium present in insoluble form into soluble form. Some of the potassium solubilizing microbes (KSMs) are *Acidithiobacillus Arthobacter ,Enterobacter , Paenibacillus , Aminobacter, Pseudomonas, Paenibacillus,, Sphingomonas,, Bacillus,Klebsiella.a*

E. Zinc solubilising microbes-Among micronutrients, zinc deficiency is the most widespread nutrient deficiency. The alternative technology for providing zinc to the plant is to inoculate the crop with the zinc-solubilizing microorganisms. A major portion of zinc available to plant is provided by the microbial activity Microbes produce organic acids, which cause decline in pH and these organic acids act on zinc complexes in soil,thus cause sequestering the zinc cation.Prominent zinc-solubilizing microbes are *Pseudomonas protegens* RY2, *Rhizobium* spp., *Bacillus altitudinis , Thiobacillus thioxidans Azospirillum* and *Gluconacetobacter*.

F. Mycorrhiza -Fungal species like *Aphalosporra, Glomous, Jaigospora, Enterophosphora* etc penetrates roots of different crops (most commonly found in Litchi) and form specialized structures like Vesicles and Arbuscles within the cortex. For this reason they are popularly known as Vesicular Arbuscular Mycorrhiza or VAM. Almost 90% of plants, including the most important agricultural crops, are associated with VAM fungi. VAM fungi reported increases the uptake of water phosphorous and some other micronutrients like Cu, Zn, Mn, or Fe. Besides these, they possess synergistic interaction with beneficial soil microorganisms such as nitrogen fixing and PSMs. VAM fungi also supply some growth regulators to plants and protects crop plants from high temperature shock, drought and salinity and prevents different disease and nematode attack

G. Organic matter decomposer – Cellulolytic, Lignolytic, Proteolytic, or amylolytic

Cellulose decomposing inoculants Many soil borne fungal species like *Aspergillus, Penicillium, Tricoderma, Chaetomium* etc. acts as activator in the decomposition process of plant bodies containing cellulose or lignin. Plant bodies rich in cellulose and/or lignin are resistant to microbial decomposition and therefore, takes long time before they could be used

as organic source of nutrition. High quality compost could be prepared within a short time by applying the mentioned fungal species into organic waste material collected from farm or community

IV-Precaution for use of biofertilizer

1. Biofertilizer containing specific species of microorganism should be applied for specific crop.
2. Biofertilizer packet should not be exposed to direct sunlight for long time, the seeds treated with biofertilizer should be kept for 30 minutes in shady place.
3. For maximum result biofertilizer should always be mixed with bulky organic manures.
4. Biofertilizer should be used before its expiry date.
5. After treating the seeds with biofertilizers, seeds should not be treated with any kind of chemical fertilizer or pesticides.
6. Chemical fertilizers should not be applied one week before or after application of biofertilizer

V-Conclusion

Biofertilizers are one of the key factors in sustainable agriculture that can assist in solving the problems of feeding an increased world population at a time when agriculture is going through various environmental stresses.Hence research should be focussed on new aspects of Biofertilizers. In current agriculture practices , chemical fertilizers have reduced the fertility of soil, making it unsuited for raising crop plants. Additionally, the excessive use of these inputs has also led to severe health and environmental hazards such as soil erosion, water contamination, pesticide poisoning, falling ground water table, water logging and depletion of biodiversity. Biofertilizers spontaneously activates the microorganisms found in the soil in an effective and eco-friendly way, thereby gaining more importance for utilization in crop production, restoring the soils fertility and protecting it against drought, soil diseases and thus stimulate plant growth. Biofertilizers lead to soil enrichment and are suitable with long-term sustainability. Further, they pose no danger to the environment and can be substituted with chemical fertilizers. The application of bio-fertilizers can minimize the use of chemical fertilizers, decreasing environmental hazards, enhance soil structure and promote agriculture.

Refrences

[1] A .Mahajan , R.D. Gupta , R.Sharma .“Bio-fertilizer-A way to sustainable agriculture”, Agrobios News letter,2008; 6 (9) : 36-37

[2] A.Sharma , R. Chetani . “A Review on the effect of organic and chemical fertilizers on plants” ,IJRASET 2017
Vol 5 (2) : 677-680.

[3] “Bacteria in Agro biology : Plant Probiotics” , Springer Nature,2012

[4] D.Das , B.S. Dwivedi , M.C. Meena , V.K. Singh and K.N. Tiwari . “Integrated nutrient management for improving soil health and crop productivity”, Indian Journal of fertilizers , 2015,11 (40):64-83.

[5] D.Kour, K.L.Rana ,A.N.Yadav, N. Yadav et al. “Microbial biofertilizers : Bioresources and ecofreindly technology for agriculture and environmental sustainablility”,Biocatalysis and Agriculture Biotechnology ,2020

[6]deskuenvis.nic.in

[7] epdf.pub

[8] Farming-2nd-revised-edition/isbn-9789381039076/zb,,73,a,5,0,c/index.html

[9]http://67.225.160.147/books/book/complete-technology-book-on-biofertilizer-organic-

[10] M . Barman , S .Paul , A.G .Choudhury , , P. Roy and J.Sen , “ Biofertilizer as Prospective input for Sustainable agriculture in India ,” Int.J.Curr.Microbial. App.Sci , 2017, 6 (11) :1177-1186.

[11] M .Milton , D.Bisariya , V.Kumar , A.K.Singh and C.M. Mehta , “Microbial fertilizers : Their Potential impact on environment sustainability and ecosystem services ,” IJCS , 2020, 8 (6) : 2308-2315.
[12] niir.org
[13] S.S.Patil, S.K.Tadvi ,A.Dikundwar , R.S.Bendre. “ The transition metal complexes of Fe (II),Ni (II) and Cu (I) derived from phthalazine based ligands synthesis, crystal structures and biological activities.”,Journal of Molecular structure, 2021
[14] S .Kumar, Diksha ., S.S.Sindhu , and R. Kumar, “Biofertilizer : An ecofriendly technology for nutrient recycling and environmental sustainability,” Curr Res Microb Sci., 2022
[15] S .Kumar, Diksha , S.S.Sindhu , and R. Kumar, “Biofertilizer : An ecofriendly technology for nutrient recycling and environmental sustainability,” Curr Res Microb Sci., 2023 :100094
[16] S. Sneha , B.Anitha , A. Sahair , N.Raghu , T.S. Gopenath , G.K. Chandrashekrappa and M .B.Kanthesh , “Biofertilizer for crop production and soil fertility,” Academia Journal of Agricultural Research , 2018, 6(8): 299-306.
[17] vdoc.pub
[18] xafricamart.com
[19] www.ncbi.nlm.nih.gov
[20] www.ijcmas.com
[21] www.biotech articles.com
[22] www.researchgate.net

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CIRS PUBLICATION

Shivpuri, Manas Marg-02, Patna-800023
Website: cirsp.com
Email: publish@cirsp.com
Date of Publication: 31 May 2024
ISBN-13: 978-81-973086-2-8

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Preface

In an era defined by collaboration and the convergence of diverse disciplines, the pursuit of knowledge knows no bounds. "Multifaceted Research" stands as a testament to this ethos, weaving together insights from various fields to illuminate complex phenomena from multiple angles.

In this edited volume, we bring together a compendium of research that transcends disciplinary boundaries, offering readers a panoramic view of contemporary scholarship. From the intricacies of social dynamics to the complexities of technological innovation, each chapter explores a different facet of the multifaceted world we inhabit.

Drawing on the expertise of scholars from diverse backgrounds, this book serves as a platform for interdisciplinary dialogue and discovery. Through its pages, readers will embark on a journey of exploration, encountering fresh perspectives and innovative approaches to pressing challenges.

As editors, we are proud to present this collection as a testament to the power of collaboration and the boundless potential of interdisciplinary research. We hope that "Multifaceted Research" will inspire readers to embrace the richness of interdisciplinary inquiry and chart new paths towards understanding and advancement.

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8. Literature and Identity: Exploration of literature's role in shaping cultural identity, social change, and political movements

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Literature has always played a very important part in shaping the society. Literature and society share a symbiotic relationship, each influencing and shaping the other in profound ways. Through the pages of literary works, readers are transported into different worlds and perspectives, offering insights into the complexities of human nature and societal structures. It provides a mirror in which individuals and societies can see themselves, as well as a window through which they can view and understand others. It is also a powerful tool for understanding, expressing, and shaping identity on multiple levels. There are several ways in which literature intersects with and influence one's identity. It has also been instrumental in reflecting and influencing social change across various periods.

Role of Literature in Shaping Cultural Identity

Literature plays a pivotal role in shaping cultural identity by reflecting and influencing the values, beliefs, and traditions of a society. It captures and preserves the history, myths, and traditions of a culture, providing a sense of continuity and a connection to the past. Literary works often mirror the values, norms, and issues of the time in which they are written, offering insight into the cultural identity of that era. Through stories and

characters, literature allows readers to experience different perspectives and understand diverse cultures, promoting empathy and cross-cultural awareness. Reading literature from one's own culture can reinforce a sense of belonging and identity, while exposure to other cultures through literature can broaden one's understanding of the world. Literature provides a platform for cultural expression and innovation, allowing writers to explore new ideas and challenge societal norms, contributing to the evolution of cultural identity. Literary movements often reflect shifts in cultural paradigms, illuminating the dynamic nature of cultural identity.

From the Harlem Renaissance to Magical Realism, each movement brings forth unique perspectives and voices, reshaping our perceptions of identity and belonging. For example, the novel "Crime and Punishment" (1866) by Fyodor Dostoevsky deeply explores Russian identity, morality, and the psychological complexities of its characters. It has significantly influenced Russian literature and thought, shaping how Russians view their cultural and philosophical identity. Another example is Anne Frank's “The Diary of a Young Girl” (1947) which is a personal account of a Jewish girl hiding during the Holocaust has profoundly shaped Jewish identity and the collective memory of the Holocaust, emphasizing themes of hope, resilience, and the human spirit. African Novelist Chinua Achebe’s Things Fall Apart (1958) is pivotal in shaping and affirming African identity, particularly Nigerian identity. It provides an African perspective on colonialism and its impacts, challenging the Western narrative and offering a profound exploration of pre-colonial African life explored through the life of Okonkwo and the Igbo society. The novel depicts the richness and complexity of Igbo traditions, values, and beliefs, highlighting the ways in which these cultural elements shape individual and collective identity.

The novel “One Hundred Years of Solitude” (1967) by Gabriel García Márquez is a cornerstone of Latin American literature, embodying the magical realism genre and capturing the complex history, culture, and identity of Latin America. It has influenced how Latin Americans view their own identity and how the world perceives Latin America. Beloved” (1987) by Toni Morrison explores African American identity, delving into the legacy of slavery and its lasting impact on African American communities. It highlights themes of trauma, memory, and resilience, contributing to the broader understanding of African American history and identity

Indian literature has also played a significant role in shaping cultural identity by reflecting the diverse linguistic, religious, regional, and ethnic tapestry of India. Writers such as Rabindranath Tagore, Bankim Chandra Chattopadhyay, and Premchand have drawn inspiration from their regional roots to create works that capture the essence of Bengal, Uttar Pradesh, and other regions, respectively. Tagore’s "Gitanjali" has not only earned Tagore the Nobel Prize in Literature but also became emblematic of India's spiritual and cultural heritage, influencing the country's cultural identity on both national and international levels. Works like the ancient epics “Ramayana” and “Mahabharata,” as well as modern novels like Raja Rao's “Kanthapura” (1938) and Salman Rushdie's “Midnight's Children” (1981) provide insights into India's complex history, shaping the collective memory and identity of its people. Writers like Mulk Raj Anand, Arundhati Roy, and Mahasweta Devi have also contributed to the ongoing discourse on cultural identity and social change.

Role of Literature in Bringing Social Change

The ability to encapsulate the spirit of a time period has always existed in literature. Through satire, allegory, and direct criticism,

literary works can challenge and critique existing power structures and authorities, exposing corruption, hypocrisy, and abuses of power. It has often been used as a tool for resistance against oppressive political regimes. During times of political turmoil, writers have courageously spoken out against tyranny through their works, challenging the status quo and giving voice to the marginalized.

From the works of Harriet Beecher Stowe to Chinua Achebe, literature has served as a powerful instrument for advocating for social change. Writers such as George Orwell and Charles Dickens used their works to critique social injustices and advocate for political reform. Charles Dickens' novels highlighted the struggles of the poor and criticized the inequities of the industrial society. By using vivid imagery and powerful rhetoric, these authors were able to ignite social consciousness and inspire action among the masses. Dickens' novel "Oliver Twist" (1838) follows the life of an orphan, Oliver, who escapes a workhouse and joins a group of juvenile criminals in London. The novel highlights the brutal conditions faced by the poor and the injustices of the workhouse system. His other novel "Bleak House" (1852) explores the themes of Legal system, poverty, and class disparity. Centered on the long-running court case of Jarndyce and Jarndyce, it highlights the inefficiencies and injustices of the Chancery Court and the impact on various characters' lives. His "A Tale of Two Cities" (1859) is set during the French Revolution, it contrasts the lives of characters in London and Paris, exploring themes of resurrection and the impact of social injustice. These novels not only provide gripping narratives but also serve as powerful critiques of the social injustices and inequities of Dickens's time.

Elizabeth Gaskell too, in her works like "North and South" (1855) addressed class conflict and the plight of the working class. Gaskell delves into the harsh working conditions faced by

factory workers and the struggles they endure. The novel depicts strikes, labor disputes, and the plight of the workers, providing a detailed look at their lives and the challenges they face. It advocates for social responsibility and mutual understanding between classes. Gaskell emphasizes the importance of empathy, communication, and reform to bridge the gap between the rich and the poor, suggesting that social progress is possible through cooperation and understanding.

Thomas Hardy's novels, such as "Tess of the d'Urbervilles" (1891) explored social constraints and the harsh realities faced by women. The novel presents Tess as a victim of the time in which she lives because both men and society treat her in an unfairly harsh way. It has been a powerful influence in the civil rights movement, promoting greater awareness and understanding of racial inequality and injustice. Mary Wollstonecraft 's "A Vindication of the Rights of Woman" is the treatise which focused on Women's rights and education and laid the groundwork for the feminist movement, advocating for equal education and opportunities for women. "The Feminine Mystique" by Betty Friedan (1963) which highlighted the dissatisfaction of many housewives in the 1950s and 1960s sparked the second-wave feminist movement, leading to significant advancements in women's rights and gender equality.

Indian English literature has also provided a platform for marginalized groups such as women, Dalits, LGBTQ+ individuals, and minorities to share their experiences and perspectives. One prominent example of Indian literature that has contributed to social change is "The God of Small Things" (1997) by Arundhati Roy. This novel explores themes of caste oppression, social hierarchy, and gender inequality in Kerala, India. The novel depicts the discrimination faced by the lower caste characters, such as Velutha, who is a Paravan, and Ammu, who faces societal backlash for her relationship with him. By

highlighting the injustices perpetuated by caste hierarchy, Roy brings attention to the need for social reform and equality. These books give readers a thorough understanding of social concerns and foster empathy and awareness in others.

Role of literature in political movements

Literature has also played a significant role in political movements throughout history by informing, inspiring, and mobilizing people. It often documents the experiences of political movements, preserving the stories of struggles and victories for future generations and providing a historical record that can inspire continued activism. Literary works can influence public opinion by shaping the way people think about political issues. Well-crafted stories and arguments can change hearts and minds, swaying public sentiment in favor of a political cause.

Literature was recognized as an important tool for change from time to time. For example, Miss Stowe's “Uncle Tom's Cabin” (!852) was directly responsible for a movement against slavery in literature and life in the USA of those days. The story tells the experiences of Uncle Tom, a loyal and devout African American slave who experienced great suffering and adversity. His character and tragic fate deeply affect readers and ignited abolitionist sentiments in the Pre-Civil War era. Likewise, literary works like Ralph Ellison's “Invisible Man” (1952) and Maya Angelou’s “I Know Why the Caged Bird Sings” (1969) illuminate African Americans' experiences living in a racially divided society. These literary works challenged the prevailing narratives of racial inequity and prejudice by capturing the hardships, resiliency, and aspirations of Black people. Readers were given a sense of urgency by these authors through vivid storytelling and moving symbolism, which motivated them to play an active role in the struggle for racial equality.

Literature has also been an essential component of feminist movements. Literary pieces like “The Yellow Wallpaper” (1892) by Charlotte Perkins Gilman and “A Room of One's Own” (1929) by Virginia Woolf scrutinized the restrictions and limitations imposed on women in patriarchal civilizations. These works, which portrayed the repressive nature of gender norms and argued for women's liberty, not only spurred conversations but also laid the groundwork for feminist activity. They gave women the confidence to challenge social norms, demand equality, and imagine a society free of gender-based discrimination.

Indian literature also played a significant role in the independence movement, serving as a medium to inspire, inform, and mobilize the masses. In the nineteenth century the Indian authors of fiction and poetry started to envision cultural unification through their works. For example, the Hindi author Prem Chand emphasized the growing separation between rural and urban areas in mainstream nationalist movements by bastardizing the schemes of the urban elite and setting his works mainly in rural India. Similarly, Mulk Raj Anand, an English-language writer, set his works among the urban poor who were disempowered by colonialism as well as by the kind of heavy industrialization that Congress encouraged. Bankim Chandra Chatterjee’s novel “Anandamath” (1882), featuring the hymn “Vande Mataram,” became a symbol of the freedom struggle. Mahatma Gandhi’s autobiography “The Story of My Experiments with Truth'’ (1929) and other writings articulated the philosophy of non-violent resistance and self-reliance. Gandhi's other book "Hind Swaraj" (1909) is a seminal piece of literature that influenced India's independence movement. In “Hind Swaraj,” Gandhi articulated his vision for India's self-rule and advocated for nonviolent resistance against British colonial rule. The book served as a manifesto for India's struggle for independence and inspired generations of activists around the world. The poetry and speeches of Sarojini Naidu who was also known as the

"Nightingale of India, were influential in mobilizing support for the freedom struggle. Bal Gangadhar Tilak used his newspapers "Kesari" (1881) in Marathi and "The Mahratta" (1881) in English to spread nationalist ideas. Mahatma Gandhi used his newspaper "Young India" (1919) and the weekly journal "Harijan" (1933) to disseminate his thoughts on independence and social issues.

To conclude, we can argue that literature celebrates the cultural heritage of a society by preserving and promoting its language, traditions, myths, and folklore. Through poetry, prose, drama, and oral storytelling, literature reinforces cultural values, norms, and identities, fostering a sense of belonging and pride among its people.it also explores the complexities of individual and collective identity, including issues of race, ethnicity, gender, religion, and nationality. Literature galvanized resistance movements by documenting injustices, inspiring solidarity, and mobilizing people to take action. By expanding awareness and understanding, literature enables people to recognize their agency, voice their concerns, and participate in civil engagement and activism.

References:

Anithalakshmi, A. K. H. (2022). Exploring Narratives of Resistance and Identity in Postcolonial Literature. Journal of Advances and Scholarly Researches in Allied Education, 6, 614-619. https://ignited.in/jasrae/article/view/14233/28270

Dr. Pankaj Kumar Singh. (2023). The Role of Language in Shaping Identity in Indian Literature: A Critical Study. The Creative Launcher, 8(4), 105–114. https://doi.org/10.53032/tcl.2023.8.4.1

"Literature and Identity: Examine the Role of Literature in Shaping Individual and Cultural Identities." International Journal

of Social Sciences & Educational Studies, vol. 10, no. 3, 2023. DOI.org (Crossref), https://doi.org/10.23918/ijsses.v10i3p381.

Mekala, Mekala. C. (2023, June). Examining the Role of Literature in Social Movements Literature as a Catalyst for Change and Activism. International Journal of Innovative Science and Research Technology. https://ijisrt.com/assets/upload/files/IJISRT23JUN1630.pdf

Voicu, C.-G. (2014). Exploring Cultural Identities in Jean Rhys' Fiction. Walter de Gruyter GmbH & Co KG.