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The Impact of Non-Verbal Communication in the Class

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Abstract

One of the most essential traits that distinguishes humans from other organisms is their ability to speak and communicate. He or she can express and communicate his or her sentiments using words and sentences. On the other hand, he/she can communicate his/her feelings or swap the meaning of words, willingly or unwillingly, in an environment with stillness and no spoken language where only body language is employed. Frowning, for example, is incompatible with a person's interest or relationship. As a result, interests, emotions, and feelings may be described effectively using this language. To put it another way, there are other eloquent languages in the world.

Key Words: Organism, sentiments, communicate, non spoken language, body language, result

Introduction:

Non-verbal communication includes all aspects of communication except the use of words. In other words, non-verbal communication includes not only gestures and movements of the body but also the way that the words are expressed, such as the music of the words, interruptions, loudness and accents; these non-verbal features affect the meaning of words¹.

Nonverbal communication abilities, often known as sign language or silent language, encompass all actions taken in the presence of another and recognised consciously or unconsciously. The major goal of this review article was to determine the impact of teachers' nonverbal communication on teaching success, based on the findings of studies on the relationship between teaching quality and teachers' nonverbal communication, as well as its impact on teaching success.

One of God's greatest gifts to humans is the ability to communicate. God not only endowed the human body with the ability to communicate in a variety of languages, but also taught him how to use it through inspiration, intuition, and external guidance. Education, or teaching, requires efficient communication with the learner in order to be successful among the various forms of communication in human communities. Teaching requires a wide range of skills, one of which is body language or nonverbal communication. Methods: His primary goal of this review article was to determine the impact of teachers' nonverbal communication on teaching success based on the findings of studies on the relationship between teaching quality and teachers' nonverbal communication and its impact on teaching success. We reviewed related research on verbal and nonverbal communication concepts, teaching concepts, and diverse teaching communication abilities in this study. The hurdles to

effective nonverbal communication in the classroom, as well as ideas for teachers' effectiveness in nonverbal communication with pupils. Communication is a concept. In his daily life, man must communicate with others. Many activities cannot be completed without interacting with people, as seen by daily activities. Communication has been defined by a number of studies and experts. Aristotle, for example, defined communication as the use of existing resources to urge others to express their thoughts and opinions. The goal of communication is to help the addressee become more motivated.

Communication is the wellspring of social development, culture, and spiritual development, therefore a lack of communication results in a relatively static state in human life, preventing any form of social progress². The ability to engage in successful, meaningful, and purposeful relationships with educators is one of the traits of professional teachers. If a teacher is scientifically qualified but unable to communicate successfully with students, he or she will be unable to educate satisfactorily, and the teaching-learning process will be incomplete.

To this purpose, scholars in the field of education should first acquire the information and abilities required to communicate effectively with students in order to increase teacher familiarity. These talents are suggested by many communication approaches as those of the link between voluntary and involuntary communication, formal and informal communication, one-sided and two-way communication, and verbal and non-verbal communication.

To this purpose, education scholars should first learn the material and skills needed to connect effectively with students in order to increase teacher familiarity. These skills are related to the link between voluntary and involuntary communication, formal and informal communication, one-sided and two-way communication, and verbal and non-verbal communication, according to various styles of communication.

Thus, teaching can be described as a teacher's planned efforts that result in a long-term change in a learner's behaviour through a mutual connection. The deeper the outcome of this contact, i.e. stable and successful learning, the better this relationship and communication skills are. Only in this manner can the instructor develop.

Nonverbal communication is more delicate and effective than verbal communication, and it can express meaning more effectively than words. A grin, for example, may communicate our feelings more effectively than words. Silent communication plays a significant role in human daily interactions, influencing one's chances of success or failure in personal and professional social relationships.

In addition, the Holy Quran makes other references to this topic, for example, "You would recognise them by their appearance" for the tolerant and destitute, and "You will know them by the tone of their voice" for the hypocrites. Imam Ali (AS) also thought that one's external appearance reflected one's internal state. When a person hides anything in his or her heart, it shows up in his or her facial expressions. "No one can hide anything in the unseen since it's obvious in his or her careless words and face."

According to surveys, just 7% of concepts are communicated in spoken words during each interaction. The majority of information is sent via a complex combination of appearance, posture, limb movement, sight, and facial emotions. On the other hand, most body language has an effect that is lower than the addressee's consciousness, i.e. the addressee absorbs the issue's significant repercussions without realising it. As a result, those who are able to use these talents have the capacity to lead others in a specific path in order to achieve their goals, which is why non-verbal communication is used in the majority of human interactions. Body

In this regard, Oskouhi et al³. conducted numerous studies on the role of non-verbal communication on educational performance of faculty members of the Agricultural Sciences and Natural Resource University in Sari; the study's findings revealed a significant positive correlation between non-verbal communication skills and educational performance of Sari faculty members of the Agricultural Sciences and Natural Resource University.

Nonverbal and sign language make up more than half of our face-to-face talks, and gestures reflect our sentiments and attitudes without saying anything. There was a link between students' accomplishment and good behaviour and the teacher's suitable and timely verbal and nonverbal behaviours⁴. According to the findings of this study, there was a link between teachers' verbal and nonverbal communication abilities and students' learning and motivation. Ambiguity in the teacher's speech is widely regarded as the most significant barrier in the relationship between teachers and pupils,

and most of the communicable diseases, according to teachers, are caused by ambiguity in the teacher's speech.

If the teacher has an encouraging manner tailored to the students' status, he/she can achieve effective results with his communication with students. Also, if the teacher uses humiliating speech, his relationship with the students will deteriorate⁵.

A message is conveyed by facial expression, eye contact, physical appearance, and so on. Facial expression is more effective than other nonverbal indicators and provides us with a wealth of information about others' emotional states, to the point that some theorists say it is the most essential source of information after language.

In the field of teaching, certainly one of the main characteristics of good teachers is good communication skill in classroom, and most of the observed stress in the classroom arises from the lack of proper communication⁶. Classroom management and constructive conflict resolution necessitate effective communication skills, the most significant of which are non-verbal abilities. Teachers can play a significant effect in their students' success by employing this talent. Teachers utilise nonverbal language to pull students' attention to further understanding, inspire them, and even thrill bored students. The pupils automatically pick up on nonverbal signals from the teacher, and they immediately detect if the person in front of them is teaching with all his or her might or is waiting for the class to conclude.

Nonverbal communication can therefore augment or replace verbal communication; it is either a repetition of verbal messages, making verbal communication more

conspicuous and specific, or it completes verbal communication. Human beings rely on non-verbal conduct to complete their interpersonal interactions; they use it to recognise when to speak, when to let others speak, and how to communicate.

Non-verbal communication often makes interactional concepts since communication always has two literal and conceptual levels of meaning, and this type of communication is associated with semantic level. It reflects cultural values. This claim implicitly indicates that most of the non-verbal behaviours are acquired during socialization and are totally variable, depending on culture and traditions ⁷.

An important point in non-verbal communication is the use of this relationship, especially when teaching correctly and timely. Teachers who had used non-verbal communication techniques in interacting with students with physical and motor impairment in Tehran province had played an effective role in increasing the students' self-esteem and reducing their shyness ⁸. An appropriate method of using non-verbal communication is that the teacher gives problem solving assignment to the student according to their intellectual ability. He shows them that he is aware of their abilities and creates motivation in them. Thus, he is willing to solve the problem; on the other hand, if the teacher indirectly tells the students that he doesn't think he is able to solve the problem, the student will be afraid as well. These mutual reactions are not important in school; rather, they are important in all human relationships, especially between parents and children.

The teacher's timely use of non-verbal communication can be accomplished through a simple greeting with pupils, which is the ideal way to begin class and is, of course, impossible without non-verbal communication ⁹. An experienced speaker starts his speech by speaking directly to one of the audience members, tries to gaze at each student one by one throughout the speech, and adjusts his voice tone throughout the speech to keep the students from becoming tired.

When pupils can see the teacher rather than being concealed behind a desk or board, or teaching with his back to the students, the teacher's nonverbal language can be more effective. Standing near his or her table, where all students can see him, is the optimum place for the teacher in class. The teacher's hands should not be in his pockets because this inhibits his ability to be active. It's great if the teacher keeps his or her hands free; this shows that the teacher is ready to communicate with the kids. The teacher must occasionally shift positions in the classroom, but if he/she does so frequently, learners' attention will be diverted and the learning process will stall. Another significant factor is when addressing a pupil, the teacher should not point to the student with his or her finger when asking a question since the kid will become afraid and uncomfortable. The best way is for the teacher to take up a space next to the student, gaze directly at him/her, and point to him/her with both hands ¹⁰.

The conscious use of non-verbal language improves the effects of individual words; the more natural the non-verbal language is, the more acceptable it is to the audience. Teachers that use nonverbal communication

effectively have a greater rapport with their students.

In the classroom, there are frequently certain barriers to good communication, both verbal and nonverbal. In order to communicate effectively, especially in the case of nonverbal communication, the educator must first identify and resolve the problems that impede good communication.

The following are the major roadblocks¹¹:

Teachers' lack of awareness of students' level of understanding: Research has shown that if educational activities are not in the realm of students' knowledge and level of comprehension, learning and achievement of educational goals are minimal or non-existent. To avoid these issues, instructional messages should first be delivered according to the students' level of understanding, and then alternative strategies, particularly nonverbal communication, should be employed for better understanding.

- Long oral arguments: When teachers only teach orally for an extended period of time, students become discouraged from participating in the teacher's debates. This suggests that people listen to their favourite sounds first, then turn off their hearing when they hear something they don't want to hear. A variety of instructional methods, communication strategies, and other approaches can be effective in resolving this issue.

Boring message: If the educational activities in the classroom are boring to the pupils, they will pay less attention to them, resulting in poor communication during the learning process. Teachers can utilise a variety of communication tactics to pique students' interest and motivate them.

Daydreaming: Another element that affects successful communication is students' daydreaming during class, which takes them out of the classroom and into their own personal experience and dream. Personal experiences, according to psychological principles, can be more appealing to individuals, and they can substitute and set aside information that are less appealing to students. Such pupils can be identified by experienced and skilled teachers, who can then communicate with them in more engaging ways. Nonverbal communication will, of course, be quite useful in such situations.

-Nonverbal communication refers to any forms of communication that do not involve the use of words. In other words, non-verbal communication include not just body motions and movements, but also the manner in which words are communicated, such as word music, interruptions, volume, and accents; these non-verbal characteristics influence the meaning of words .

Space Language: When we communicate with someone, we automatically maintain personal space with him. This area is influenced by the culture and positions of those who inhabit it. Friends, for example, are closer than strangers. Intimate space, personal space, social space, and public space are the four types of space.

Touch is a child's initial sense of his or her body following birth, and it is through touching that he or she learns about his or her relationships with others.

Clothing and appearance are frequently the basis for initial impressions about people, and they have a considerable impact on how others see us. In truth, objects speak to us in

a variety of ways, from the clothes we wear to the food we serve our guests.

Our relationship with people improves and becomes more successful when we explore the concept of time in different cultures.

Sign Language and Passwords: A password is a collection of signs and symbols that can be put together in a way that is significant to some people.

Phonetics language distinguishes our emotions from one another and influences our perceptions of people's personalities and social characteristics. Every human being's voice is distinct and made up of qualities that are entirely his or hers.

Conclusion:

It was decided that if teachers used this talent, it would have a favourable and profound impact on pupils' mood. Because non-verbal communication is highly reliable in the communication process, if the recipient of a message is torn between two contradictory verbal and nonverbal messages, logic dictates that we push him

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toward the non-verbal message and ask him to pay more attention to non-verbal than verbal cues because non-verbal cues frequently reveal the sender's intention and reflect his/her emotional reactions. Based on the findings of this study, it is suggested that paying attention to nonverbal communication skills can result in a beneficial transformation in one's life. Teachers, especially those who frequently contact with large groups of pupils, appear to need to practise and master effective communication skills. The quality of the relationship and how the instructor establishes this relationship with students is one of the aspects that contribute to students' success or failure. It is especially useful for kids who are more sensitive to interpersonal relationships and communication abilities. Finally, teachers should work on improving their communication skills in order to better communicate with their students. It is suggested that the government assist teachers in improving their communication abilities by holding training sessions.

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Problems and Potential of Fort Tourism in South Konkan

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Abstract-

Tourism is known as one of the important industry in world and India. In last few years new trends have emerged in tourism. Fort tourism is an ideal example of it. Konkan which is important part of Maharashtra state has a rich history, culture and heritage. South Konkan is known for the land of lord Parshurama and for its maritime history. Historical tourism is not developed in the Konkan up to its potential. Now a days young generation is coming out for trekking, mountaineering, hiking and many more adventure activities in Western Ghat or Sahyadri ranges. Most of the forts are located in the Western Ghat and in the coastal areas where the tourists are coming in large numbers. This is the good opportunity to divert such tourists towards fort tourism if the basic infrastructure has been provided to them. It will help the local people and regional development.

In this paper an attempt has been made to know the potential of fort tourism and the problems associated with Fort Tourism.

Key words - New Trends, Historical tourism, Adventure activities, Fort tourism.

Introduction

Maharashtra, the famous state of India, occupy a large portion of the Deccan plateau in the western peninsular part of the subcontinent. Maharashtra is called the gateway of India and is one of India's biggest commercial and industrial centres. It has played a significant role in the country's social and political development. Maharashtra is a 3rd largest state of India in size. Maharashtra is known for its complex range of physical diversity. Maharashtra is home to a repository of natural beauty, architectural wonders, festivals, traditions, gastronomy and glamour. Maharashtra is one word, but it speaks volume of its rich culture and diverse people. It is said that there is something for everyone. Maharashtra is also known as Trekkers paradise with green hills, doted lakes and forest. Maharashtra has unlimited tourist resources and it's seen from the campaign of Unlimited Maharashtra.

Culture of Maharashtra is amalgamation of festivals, dances, music, art and craft, food, costumes. It's important to know about history but it's the culture which defines a state in its own style, it is very true about Maharashtra. Maharashtra has a variety of tourist destinations like as beaches, forts, caves, hill stations and wildlife sanctuaries to temples and shrines, adventure sports, as well as lakes and waterfalls. It has five UNESCO World Heritage Sites i.e. the Ajanta Caves, Ellora Caves, Elephanta Caves, Chhatrapati Shivaji Terminus (CST) (previously Victoria Terminus) in Mumbai and the Western Ghats. Tourism has become one of the most important activities in most of the districts of Maharashtra. Due to the rich past history and 350

forts which are the major attractions to the tourists who visits the state. Maharashtra is divided into five geographic regions. Konkan, Western Maharashtra, Marathwada, Khandesh and Vidarbha. Konkan Which is one of the important division and extends throughout the western coasts of Maharashtra. It has 720 k.m. coastline and bounded by the Western Ghats mountain range (also known as Sahyadri) in the east, the Arabian Sea in the west, the Daman Ganga River in the north and the River Terekhol in south. In this paper an attempt has been made to identify the potential forts for tourism development and the problems associated to fort tourism.

Objective-

- 1- To know the development of tourism in South Konkan.
- 2- To understand the tourism potential in South Konkan region.
- 3- To identify the potential of fort tourism in South Konkan
- 4- To suggest the remedies for development of fort tourism in South Konkan.

Research Methodology –

The study of this research is based on primary and secondary data. Primary data is collected through the field visits and questionnaires. Secondary data is collected from the published documents such as Government reports, magazines, newspapers and internet.

Brief history of forts -

Forts were very important for primary defense in Maharashtra against enemy invasions, and had been so since ancient times. They are known in the local language as 'killa' (or 'qila' in Urdu). One of the early reference to forts in the

subcontinent occurs in the ancient political treatise, 'Arthashastra' by Kautilya, whereby Kautilya classifies the forts as Jal durg (water forts), Giri durg (mountain forts), Vana durg (forest forts), Dhanu durg (arid/desert forts located in conditions which are devoid of a ready water supply), Mahi durg (brick forts), and Nar durg (human forts), not to mention the ancient cities in kingdoms such as Mathura, Magadha, and so on which were also mentioned as being fortified settlements. The social treatise, 'Manusmriti' by Manu, also describes the advantages and disadvantages of different classifications of fort.

Due to its peculiar topography, Maharashtra has always revealed in different forms of fort constructions. Its structures and architectural designs have differed depending upon their region and location, whether these are on the plains, coastal areas, hilly terrain or in the dense forests. The forts in Maharashtra were constructed from the point at which some of the early ruling dynasties (and their vassals) held power, such as the Satvahanas, the Rashtrakutas, the Kadambas, the Chalukyas, the Yadavas, the Afghans, the Bahmanis, the Gonds in Berar, the sultanates of Ahmednagar, Bijapur and Berar, the Siddis, the Europeans (British, Portuguese), and last but not the least the Marathas. The Marathas gave tremendous importance to forts as they were their strongest defence against marauding invaders. Due to the inherent hilly terrain of the Sahyadri range, most of their forts belonged to the 'hill' category.

The Forts in Maharashtra can be divided in the following types-

1. Hill forts
2. Sea forts
3. Land forts
4. Forest forts
5. Human forts

Hill Forts

These forts are constructed on the high hills by using stone cut from the mountains. The high altitudes made these forts safe from the enemy. In the Marathi these forts are called 'Giri Durg' ('giri' means the mountain and 'durg' is the term for a fort), Raigad, Rajgad, Purandar, Sinhagad, Pratapgad, Shivneri, Rajmachi, and so on. The hill forts are most common in Maharashtra and scattered all around the Sahyadri mountains. They are located at short distances from each other and were accessed by crossing a couple of mountains. If a fort was captured by the enemy, this allowed the king and his officials to escape and easily reach the next fort. Hill forts were constructed from stones carved out of the very mountains, and were attached (depending upon the design) with the help of lime, rubble, gravel, stones, bricks (used mainly in land forts or smaller forts), molten metal and sand. Lime or mortar was

ground on the fort itself (in what were called the 'Chunyaachya ghaani', 'chuna' being the term for lime), with the help of a roller passing through a circular channel.

Land Forts

These forts were created on the plains. In Marathi they were called 'Bhuikot' (Durg), and examples include Chakan fort, Bahadurgad, Solapur fort, Ahmednagar fort, and so on.

Sea Forts

These forts were created in the middle of the sea and protected by its vicious waves. In Marathi they were called 'Jal Durg', and examples include Janjeera, Sindhudurg, Suvarndurg and Padmadurg. The Suvarnadurg fort in Dapoli is one of the few forts to be built in the sea.

Forest Forts

These forts were created amidst dense jungle, protected by the heavy tree cover, along with reptiles and wild animals. They were the 'Vana Durg', and Javali is one such example.

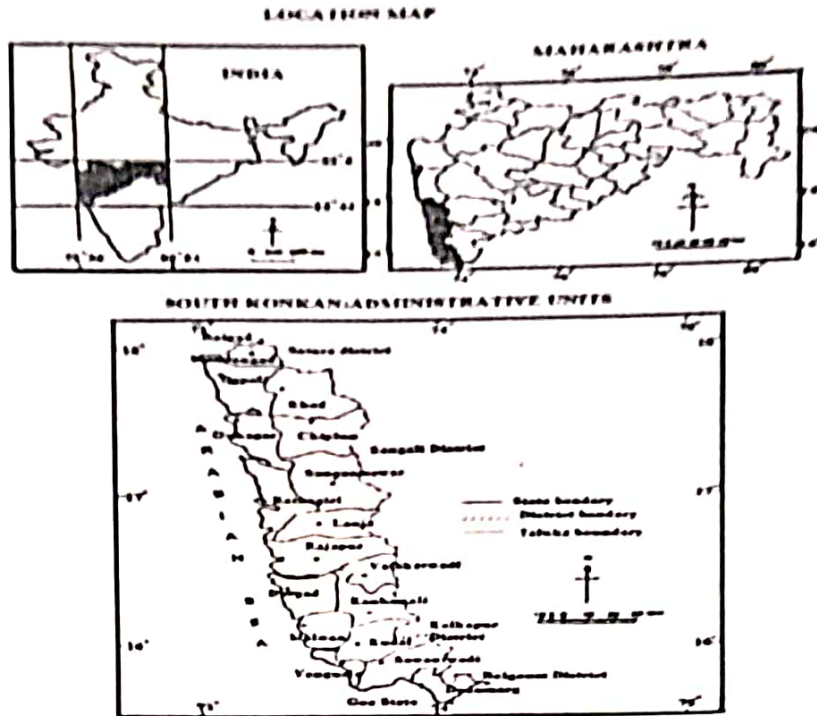
Human Forts

These formations were created as a direct result of human warfare, and encampments often resembled forts. These are the 'Nar Durg'.

Study region -

Konkan region is a naturally gifted area of the Maharashtra state. Konkan is well known for its natural beauty and is emerging as a favorite tourist destination for lot of people. Konkan's greenery, coconut trees, beautiful virgin beaches, waterfalls, mountains and lush green valleys definitely provides a rich and pleasant experience for the tourists. Tourism in Konkan is developing very fast. Tourists from Maharashtra now prefer to visit Konkan because of several reasons like close vicinity, easy accessibility due to better roads and Konkan railway. The economically cheap accommodation and overall lower costs for visiting previously unexplored places is an added attraction to the tourists. Local people depending mainly upon fishing and farming activities for their livelihood but nowadays people are shifting their livelihood with the help of growing Tourism in the region. Fort tourism is a new path for the local people in Konkan because there are nearly 129 forts. If the potential of this fort tourism is grabbed it will be better for the youth in Konkan and it will reduce the out migration of the youth. A coastal strip of land bounded by Sahyadri hills on the east and Arabian Sea on the west. Konkan region is extended from Palghar in north to Sindhudurg in south including the districts like Palghar, Thane, Raigad, Ratnagiri and Sindhudurg while Ratnagiri and Sindhudurg districts are the part of south Konkan. The latitudinal location of south Konkan is 15°37' to 18.04' north latitudes and 73.02 to 74° 13' east longitude. These two districts have total 46 forts which are sea

Forts, hill forts, land forts. Some of them are very famous but most of them are not yet explored properly.



Location Map – South Konkan

Forts in South Konkan are classified as under -

1. Hill Forts – Sumargad ,Rasalgad, Prachitgad, , Mandangad ,Padmnabhdurg/ Panhaleldurg , Palgad , Govalkot , Sadanandgad, Ramgad, Bhagvantgad, , Bhartgad, , Sidhagad, Shivilanka, Manohargad ,Masantoshgad, Mahadevgad,
2. Sea forts – Sindhudurg, , Suvarndurg
3. Land forts – Himmatgad/ Bankot, ,Govagad, Fattedurg, Kanakdurg, Anjanvel,Vijaygad , Jaigad, Ratnagiri, Purngad ,Aanmbolgad , Yashvantgad, Vijaydurg, Devgad ,Sarjekot, Rajkot,Padmgad, Nivati,Yashvantgad, Kharepatan,
4. Forest forts- Mahiptgad, Barwai , Kolkevadi , bhavanidurg , Mahimatgad, Bhairavgad, Songad,Narayngad, Hanumantgad,

Few forts which have potential as fort tourism are discussed as per following-

1 - Hill Forts -

Sumargad –

The fort is located in the mid hill range which extends in the North South direction and runs parallel to the Sahyadris in Khed Tahsil. Due to its difficulty in access, height and tough to climb. Fort has straight rock surfaces from all the sides of the fort and on the way sometimes it is necessary to do rock climbing to reach to the fort. There are some water tanks on the fort.

Rasalgad fort -

The fort is located on southern tip of a hill range that spans in the North South direction and runs parallel to the Sahyadris . Out of the three forts situated in this range, only Rasalgad is easy to reach. The fort is spread on an area of 5 acres. The fort has temples of two goddesses Solai and Waghai which are known for carvings. On the North Western side there is citadel which has a storehouse and palace. In the southern part there is one water tank in the cave having four pillars. There are canons on some bastions of the fort. The known history of the fort starts from the time of Chatrapati Shivaji Maharaj .This fort was won by Chatrapati Shivaji Maharaj from More of Javali.In 2003, Rasalgad was declared as a protected monument by Archaeological Survey of India.

Mandangad fort –

Mandangad fort is known as most ancient fort in the Ratnagiri district and was commissioned in the 12th century during the realm of king Bhoj. The fort is in riun condition in some parts, but one can see lot of ancient relics here. Fort is classified as Giridurg and has security walls created in an expanse of 8 acres. It's wonderful to see a perennial lake created in black rock or basalt.

Gowalkot fort-

This fort is also known as Govindgad or Gowalkot fort. The fort is located 3 kms. from

Chiplun and eastern side of the village Gowalkot. This fort is surrounded by Vashishthi river from north and by Vatoli river to the southern and western sides. Due to this it looks like island style delta. This fort has been repaired by Chhatrapati Shivaji Maharaj and at the base of fort Shree Devi Kanjeshwari temple is situated.

Prachitgad fort-

This fort is also known as Uchitgad or the fort of Shrungarpur. The fort is spread across 5 acres. Shrungarpur is a place of in-laws of Chhatrapati Sambhaji Maharaj. It is situated in the Sahyadry ranges. Chhatrapati Shivaji Maharaj won Shrungarpur and constructed this strong fort. This fort is difficult to climb so has the patience to visit.

Bhairavgad fort-

This fort is also coming in the category of Giridurg. The fort is located 45 kms. from Chiplun and from Derwan it is 12 kms. Durgwadi, Gowal villages are the base for this fort but it is convenient from Durgwadi. The fort is very difficult and challengeable to climb for mountaineers also.

Sadanandgad fort, Ramgad, Bhagvantgad, Bharatgad, Sidhagad, Vetalgad, Kharepatan, Manohargad, Mansantoshgad, Mahadevgad, are known as hill forts in Sindhudurg district.

2- Land Forts/ Coastal forts-

Bankot fort-

Bankot is a small fort located in the Tehsil of Mandangad. It was made part of the Bombay Presidency in 1756. A Greek expert Lini has mentioned this fort as Mandagir in the first century A.D. When the fort has been transferred from Portuguese to the Maratha Empire it was named as Himmatgad. Again British regime took it from Angre and renamed as Victoria. This fort has a memorial cemetery of the wife of Charles Mallet and created in the year 1791.

Bankot fort was the first residency of the British Raj in Southern Konkan.. The Marathas renamed the fort as Himmatgad.

Gopalgad -

The Gopalgad fort at village Anjanvel, - Guhagar, Dist-Ratnagiri is a coastal fort with an approximate area of 7 acres. The main fort has been extended by different rulers during different times. The main central fort was constructed by the Bijapur rulers in the 16th century. Chhatrapati Shivaji Maharaj annexed this fort during his Dabhol campaign in 1660. After the death of Shivaji Maharaj in 1680, this fort was annexed by Siddi Khairat Khan in 1699. In 1744 the Maratha warrior Tuloji Angre captured this fort and added it back to the Maratha Kingdom (then Peshwa rule).

Jaygad Fort

The fort of Jaygad is located at 25 Kms from Ganpatipule and 50 kms. from Ratnagiri. The fort is still in a good condition. The fort was

primarily built for guarding the Jaygad port. This fort has erected by Vijapurkar in the Shastri river creek and is located north of the village. The fort has been designed with two areas i.e. Balekilla (the upper fort) and Parkot (the security wall). The fort has 28 fortifications.

Purnagad fort

Purnagad fort is spread in an area of 22 acres. The fort is located at the mouth of Muchkundi creek. The fort is in good condition and has some cannons in the fort. In the 18th century this fort was commissioned as desired by Peshwas. It is said that the construction of this fort was mainly from the point of the commerce.

Yashwantgad fort -

Yashwantgad fort has been erected on the banks of Jaitapur creek. It is spread over 7 acres and the creek water has from two sides. The fort was erected in the 16th century during the Vijapur Regime.

Ambolagad fort-

Ambolagad fort is 5 kms from Yashwantgad and it is in the village only. The fort can be identified from the relics of security walls of the forts. It has expanded on 5600 square meters. The security walls have been constructed with black basalt rock which indicates that it has been built around 11th century during Shilahar regime.

Goa, Fatehgad and Kanakdurga forts -

First fort is Goa fort and its security walls are still in good condition. In the left of Goa fort Fatehgad fort is situated but most of the relics of fort are lost. Kankdurg is located just close to Harnai port. This fort has sea from three sides and it is in ruin condition. The forts were built by Adilshah and later captured by Chatrapati Shivaji Maharaj in 1660. Earlier there was a tunnel connecting both the forts but now only way to go to Suvarnadurga is through a boat.

Vijaydurg -

The fort is located on Vaghotan creek and renovated by Chatrapati Shivaji Maharaj. Three sides are covered by water and from one side is land.

Devgad fort -

This fort is located near the plateau of Devgad. Sarjekot fort, Rajkot, Padmgad, Nivati fort, Yashvantgad, are the examples of land/ coastal forts in Sindhudurg district.

3 - Forest forts-

Mahipatgarh Fort

Mahipatgarh Fort is on the east of the Khed. It is one of the biggest strong hold in Maharashtra, with a range of 120 acres. The erection of fort was carried out in the regime of Vijapurkar. In 1661, Chhatrapati Shivaji Maharaj included this fort in the Swarajya. Bhavanigad Bhavanigad is located in Sangameshwar tehsil. There is a big temple of Goddess Bhavani, it is said that it is built in the

14th century. Shivaji Maharaj renovated this fort in 1661. The British won this fort in 1818. After a steep walk for 5 minutes, we reach towards few cisterns. In this temple, there is a bust of Shivaji Maharaj and an ancient idol of Goddess Bhavani.

Maimatgad fort -

This fort is located 20 kms. away from Devrukh on the eastern side. Nigudwadi village is the base of this fort. The fort has an expanse of 12 acres. Due to steep rising apexes on the three sides the fort has been bestowed with a natural security and from the fourth side the security wall has been constructed. The fort has a total of 8 fortifications. Apart from above forts Bhairavgad, Songad, Narayangad, Hanumantgad are forest forts located in different parts of Sindhudurg district.

4 - Sea forts -

Sindhudurg fort-

Sindhudurg fort in Maharashtra, one among the many forts built by the great Chhatrapati Shivaji, is a fusion of elegance and antiquity. The fort lies on a rocky island just off the coast of Malvan which is accessible by a boat from mainland. The district is named after the fort of Sindhudurg which means 'Fort in the Sea'. This fort was the main Maratha headquarters to prepare for wars, battles and also to provide security to Maratha people. The fort built on the orders of Shivaji took three years to complete with almost 100 architects from Portugal and a manpower of 3000. The fort is spread over an area of 48 acres with fortified walls, 12 ft thick and 29 ft high, stretch for 2 miles. Over 4000 mounds of iron were used in the casting and foundation stones were firmly laid down in lead.

Underwater passages are still a matter of skill and the brilliant tactician and monarch in Shivaji which had made it possible in the 16th century. The fort has a hidden passage in the temple.. This passage goes under the fort for 3 kilometres and 12 kilometres beneath the sea and from there 12 kilometres in to a nearby village which was used as an evacuation pathway for people.

Due to the architectural brilliance and uniqueness, this fort has its own identity in world. In the fort there are 3 temples inside which are dedicated to Goddess Bhavani, Lord Hanuman and Jarimari. One important characteristic of this fort is a popular temple which is devoted to Chhatrapati Shivaji, the only one of its kind in the world. It is also known for the hand-prints as well as footprints of Chhatrapati Shivaji which can be seen on a slab. Sindhudurg fort is undoubtedly an unique fort on various dimensions which attracts thousands of tourists.

Suvarnadurga , -

These forts are located at 17 kms. from Dapoli at Harne, The Suvarnadurg fort consists of

three subsidiary forts, Kanakdurga, Fatehgd and Goa forts, which are the land forts and Suvarnadurga is a sea fort.

Problems of fort tourism in South Konkan -

The fort tourism has a great potential in South Ratnagiri, but due to various issues the fort tourism has not reached up to its potential still. Following are some problems which have been observed during research in the study area -

- 1- Good conditioned roads
- 2- Lack of awareness among the local people
- 3- Ruin conditions of most forts
- 4- Non-availability of information about forts
- 5- Littering and garbage
- 6- Lack of Accommodation and food facilities
- 7- Irresponsible behaviour of tourists
- 8- Negligence of Government authorities
- 9- Non-availability of Signage boards and route details
- 10- Lack of basic facilities

Suggestions -

Tourism has enormous potential in Konkan, especially in south Konkan. Development of tourism in south Konkan will definitely have a positive impact on the local economy. If the fort tourism has been promoted it will be a unique identity of South Konkan all over in the state. It is observed that there is lack of information about our own maritime history, the rich legacy of Maratha Empires and the role played by all these forts in fighting with the dominance of European people. It is suggested that if these forts are maintained properly and conserved according to the tourists specially the youth who are the major part of the historical tourism, it will help to the development of tourism on a long way.

Recommendations -

Tourism is known as one of the important activity in Maharashtra. In last two years of pandemic this industry has faced tremendous loss, so if the government wants to promote, boost the industry in its back position, some new trends have to be adopted. Fort tourism is one such new type of tourism which should be promoted in south Konkan for the local development.

For the development of tourism in south Konkan some of the following facilities should be provided to the tourists.-

- 1- Detail history of the Konkan and the Maratha empires should be shown through the documentary or museums.
- 2- History of the forts and their importance, role in the history should be highlighted.
- 3- It is very important to prepare the maps showing the suitable roads, signage boards in the beginning of the travel.
- 4- Minimum basic facilities for the tourists should be provided by the local authority or the government, because these forts are inspiration

for thousands of youths regarding our past rich history.

- 5- Fort tourism will support the local people , villages, their culture through the cuisines, folk arts, dance forms and traditions which will help to conserve and protect our own culture, rich history or heritage.

In short we can say that, the development plans are associated with our maritime history, it will not help only for the regional development but also it will helpful to keep our rich history and heritage alive.

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Study of Physico-chemical Properties of Wild Honey from Nashik District of Maharashtra

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ABSTRACT

Honey is the opaque viscous liquid produced by honey bees from the nectars of flowers. It is used in breakfast to retain energy in daily life, due to its high calorific value. The glucose and mineral content in the honey, decides the nutritional value of honey. The percentage of glucose and minerals present in the honey is affected by seasonal and geographical conditions. The quality of honey can be checked by analyzing its Physico-chemical characteristics. In the present study, the quality of wild honey from the Nashik district of Maharashtra state is checked by analyzing the physicochemical properties. The investigated honey samples were collected from 15 tehsils of Nashik district. The collected samples were analyzed for moisture content, ash content, pH, colour intensity, viscosity, specific gravity, electrical conductivity, glucose and total protein content. The honey with low moisture content, high glucose, and mineral content has high calorific value and longer storage life. The study shows that the collected wild honey samples are of good quality and fit for daily diet due to rich nutritional value. The study highlights the nutritional value of honey in the daily diet and thus can be used as an additional income source by farmers.

KEYWORDS: Honey, Physico-chemical properties, Quality, Glucose.

INTRODUCTION

Honey is an unfermented, sweet substance produced by honeybees from the nectar of blossoms or the secretions of or on living parts of plants, which they collect, transform, and combine with a specific substance before storing and ripening in honeycombs. Honeybees collect, transform, and combine with a specific substance before storing and ripening in honeycombs. In addition, honey must be free of any undesirable flavors, aromas, or taints that may have been absorbed from foreign materials during processing and storage, and it must not include natural plant toxins in a level that might be considered a harm to human health. Honey is mostly composed of carbohydrates, which account for approximately 95% of its dry weight in terms of weight [1]. Bee honey is one of the few foods that is practically completely non-allergic and that the body may readily absorb. It includes nutrients, which are particularly beneficial as an energy source [2, 3]. It is a high-energy carbohydrate diet (80–85 percent), and the honey sugars are easily digested, similar to those found in many fruits. Honey contains more than 22 sugars, with fructose and glucose being the majority of the sugars [4]. Honey includes more than 180 different components, including amino acids, enzymes, protein, vitamins, minerals, ash, organic acids, and phenol compounds, amongst other nutrients [5].

Honey has held a revered position in traditional medicine for hundreds of years [6, 7]. However, because of a scarcity of empirical evidence, it has only a limited application in modern medicine [8]. The usage of honey to alleviate hepatic, cardiovascular, and gastrointestinal disorders has been recognized for quite some time [9]. Ancient Egyptians, Assyrians, Chinese, Greeks, and Romans used honey to treat wounds and intestinal disorders, as did other civilizations [10]. Multiple research organizations have been studying honey since it was first discovered a few decades ago, both in the laboratory and in the clinic. The most notable discovery was the antibacterial property of honey, which has been highlighted in several research publications over time [11, 12]. Bactericidal action of natural honey has been demonstrated against a variety of pathogens, including Salmonella, Shigella, Escherichia coli [13, 14], Helicobacter pylori, and others. Honey was shown to be just as beneficial as prednisolone therapy in an inflammatory model of colitis [15].

Nashik district is located in the upper Godavari Basin and the Tapi Basin, with a portion of its territory in the Tapi Basin. 19° 35' 18" North latitude to 20° 53' 07" North latitude and 73° 16' 07" East longitudes to 74° 56' 22" East longitudes are the coordinates for the location of this point. Due to diverse physical, geological, edaphic, and climatic characteristics of the Nashik district we aimed to study the quality of wild honey from this region. In the present study we have collected samples from 15 tehsils of Nashik district and analyzed them for

moisture content, ash content, pH, colour intensity, viscosity, specific gravity, electrical conductivity, glucose and total protein content.

EXPERIMENTAL

Honey samples were collected from the wild regions of 15 tehsils from Nashik district Maharashtra. First sample stations were located with the help of beekeepers and tribal peoples of the respective tehsil. All the wild honey samples were extracted from honey hives. As there is a time lag between collection and analysis of honey samples preservation is important. Therefore, all the collected honey samples were preserved at room temperature in sterilized, airtight amber-colored bottles. To remove suspended particles of wax, dirt, and insoluble impurities, the collected samples were filtered through a fine cloth before preservation. The preserved honey samples were analyzed to know their Physico-chemical properties like pH, colour intensity, electrical conductivity, specific gravity, viscosity, reducing sugar content, ash content, moisture content & total protein content.

All the chemicals and reagents used for the analysis were of AR-grade quality. The required instruments like Conductivity meter, pH meter, Hot air oven, Muffle furnace, Conductivity Cell, Combined glass electrode, Desiccator, etc. were used after calibration and standardization. The methods used for the physicochemical analysis of honey samples were based on official methods of analysis of A.O.A.C. [16].

RESULTS AND DISCUSSION

All the honey samples gave a sweet smell and taste. The physicochemical characteristics of collected and preserved honey samples are listed in the **Table 1** and **Table 2**.

Table.1: Physico-chemical characteristics of honey samples.

| Sr. No. | Sample ID | pH | Colour intensity | EC (ms/cm) | Specific gravity | Viscosity (Poise) |
|---------|-----------|-----------|------------------|------------|------------------|-------------------|
| 1 | NSKBAGL01 | 5.23±0.04 | 513±1.23 | 1.37±0.07 | 1.2648 | 14 |
| 2 | NSKCHAN02 | 5.44±0.05 | 627±1.17 | 0.85±0.04 | 1.2254 | 12 |
| 3 | NSKDEOL03 | 5.22±0.04 | 343±1.22 | 0.74±0.05 | 1.2976 | 14 |
| 4 | NSKDIND04 | 5.38±0.06 | 377±1.45 | 0.45±0.02 | 1.2485 | 10 |
| 5 | NSKIGAT05 | 5.46±0.04 | 484±1.23 | 1.52±0.01 | 1.3387 | 25 |
| 6 | NSKKALW06 | 5.59±0.08 | 647±1.57 | 0.64±0.03 | 1.2966 | 10 |
| 7 | NSKMALE07 | 5.47±0.07 | 641±1.87 | 0.62±0.02 | 1.2249 | 14 |
| 8 | NSKNAND08 | 5.13±0.03 | 538±1.44 | 0.88±0.03 | 1.2276 | 10 |
| 9 | NSKNASH09 | 5.20±0.04 | 491±1.83 | 0.63±0.04 | 1.2753 | 16 |
| 10 | NSKNIPH10 | 4.82±0.06 | 478±2.08 | 1.82±0.05 | 1.3275 | 25 |
| 11 | NSKPETH11 | 5.57±0.04 | 528±1.26 | 0.57±0.04 | 1.2682 | 10 |
| 12 | NSKSINN12 | 5.55±0.05 | 633±2.53 | 0.63±0.07 | 1.2153 | 14 |
| 13 | NSKSURG13 | 4.44±0.02 | 402±1.17 | 0.52±0.01 | 1.2663 | 10 |
| 14 | NSKTRIM14 | 5.40±0.05 | 275±1.28 | 1.92±0.02 | 1.4748 | 25 |
| 15 | NSKYEOL15 | 4.93±0.03 | 448±1.53 | 0.95±0.04 | 1.2969 | 10 |

[EC = electrical conductivity, ms = milli siemens]

pH: The pH values of all 15 samples were measured and found to be within the permissible limit (pH 3.40 to 6.10). The pH values of all honey samples collected from the Nashik district are found to be nearly equal and acidic. From the results, it is observed that a pH value varies from 4.44±0.02 to 5.59±0.08. The low pH of honey resists to the growth of microorganisms and provides stability and texture to honey.

Color Intensity: The color intensity of honey samples increases from yellow to dark brown. The source of nectar from which honey is extracted by honeybees affects the color intensity. The highest colour intensity is found to be 647±1.57 while the lowest is 275±1.28.

Electrical Conductivity: The electrical conductivity of honey is due to the presence of mineral ions and organic acids. The amount of organic acids and minerals depends on regional and seasonal factors. All the studied samples show electrical conductivity in between 0.45 ± 0.02 to 1.92 ± 0.02 ms/cm. The electrical conductivity of the sample having sample ID NSKTRIM14 is high, indicating that it contains a high amount of minerals and hence has a high nutritional value.

Specific gravity: Due to the presence of minerals and carbohydrates, the specific gravity of the honey is always larger than the water. The range of specific gravity of studied samples is from 1.2153 to 1.4748.

Viscosity: The range of viscosity is between 10 to 25 poises. The honey samples with sample ID NSKIGAT05, NSKNIPH10 & NSKTRIM14 are highly viscous.

Reducing Sugar (Glucose) content: The sweet taste of honey is due to the presence of carbohydrates like – sucrose, glucose, fructose, etc. In the present investigation, all the honey samples were tested for glucose content only. The glucose content in the tested honey samples ranges from 24.52 ± 0.52 to 39.43 ± 0.14 g/100g.

Table.2: Reducing sugar (Glucose), Ash, Moisture and Total protein content of honey samples.

| Sr. No. | Sample ID | Glucose g/100g | Ash (g/100gm) | Moisture (g/100g) | Total protein (mg/g) |
|---------|-----------|-----------------|----------------|-------------------|----------------------|
| 1 | NSKBAGL01 | 24.52 ± 0.52 | 1.04 ± 0.02 | 13.36 ± 0.14 | 1.63 ± 0.12 |
| 2 | NSKCHAN02 | 26.43 ± 0.32 | 0.98 ± 0.04 | 12.24 ± 0.16 | 1.54 ± 0.13 |
| 3 | NSKDEOL03 | 24.54 ± 0.48 | 1.06 ± 0.03 | 10.23 ± 0.28 | 1.38 ± 0.04 |
| 4 | NSKDIND04 | 25.57 ± 0.36 | 1.12 ± 0.03 | 14.84 ± 0.26 | 1.31 ± 0.08 |
| 5 | NSKIGAT05 | 38.46 ± 0.23 | 1.16 ± 0.03 | 16.62 ± 0.24 | 1.78 ± 0.13 |
| 6 | NSKKALW06 | 27.57 ± 0.54 | 1.03 ± 0.01 | 12.72 ± 0.21 | 1.62 ± 0.27 |
| 7 | NSKMALE07 | 26.28 ± 0.43 | 1.15 ± 0.03 | 09.81 ± 0.15 | 1.51 ± 0.16 |
| 8 | NSKNAND08 | 24.58 ± 0.68 | 0.83 ± 0.01 | 10.56 ± 0.36 | 1.59 ± 0.08 |
| 9 | NSKNASH09 | 28.27 ± 0.82 | 1.07 ± 0.03 | 16.42 ± 0.24 | 1.91 ± 0.21 |
| 10 | NSKNIPH10 | 38.43 ± 0.58 | 1.15 ± 0.02 | 18.42 ± 0.12 | 1.53 ± 0.16 |
| 11 | NSKPETH11 | 27.82 ± 0.34 | 0.92 ± 0.01 | 10.28 ± 0.44 | 1.58 ± 0.12 |
| 12 | NSKSINN12 | 27.46 ± 0.53 | 1.14 ± 0.02 | 11.24 ± 0.22 | 1.60 ± 0.96 |
| 13 | NSKSURG13 | 25.46 ± 0.57 | 1.12 ± 0.02 | 10.33 ± 0.26 | 1.45 ± 0.09 |
| 14 | NSKTRIM14 | 39.43 ± 0.14 | 1.18 ± 0.03 | 10.18 ± 0.12 | 1.57 ± 0.16 |
| 15 | NSKYEOL15 | 25.41 ± 0.56 | 1.04 ± 0.01 | 12.85 ± 0.38 | 1.52 ± 0.47 |

[g = gram, mg = milligram]

Ash content: Ash content in honey samples reveals the nutritional value of honey. It determines the concentration of minerals present in the honey sample. The ash content in all honey samples from the district was analyzed and it ranges from 0.83 ± 0.01 to 1.18 ± 0.03 g/100gm. The ash content is found high in the honey sample with sample ID NSKTRIM14.

Moisture content: The moisture content in honey depends on geographical conditions like – temperature and relative humidity. The high moisture content in the honey decreases its storage life due to fermentation. The low moisture content in the honey prevents it from fermentation and attack by microorganisms. Observed results show that moisture content in the collected honey samples ranges from 09.81 ± 0.15 to 18.42 ± 0.12 g/100g. Out of 15 studied samples, the moisture content is found to be high in the honey sample with sample ID NSKNIPH10.

Total protein content: The total protein content in all tested samples was found to range from 1.31 ± 0.08 to 1.91 ± 0.21 mg/g.

CONCLUSION

The present study reveals that all the studied wild honey samples from the Nashik district of Maharashtra State are of good quality and fit for daily diet due to their rich nutritional value. The honey with low moisture content,

high electrical conductivity, and high glucose content will be having high nutritional value, longer storage life, and thus have good quality. Among all the samples analyzed, the honey sample with sample ID NSKTRIM14 is found to have good quality. The study highlights the nutritional value of honey in the daily diet and thus can be used as an additional income source by farmers. Honey bees while extracting the honey from the flowers also help in the pollination process increasing crop productivity. Thus, the commercialization of honey in the food industry will help increase the growth of the agro-economy.

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A Review on Synthesis and Biological Applications of Imidazole and its Derivatives

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ABSTRACT

Synthesis of the heterocyclic compounds is an interesting area in the field of chemistry and pharmacology due to its versatile nature. Among such heterocyclic compounds, imidazole and its derivatives have gained unique position because of its presence in natural products like nucleic acid, histidine, and purine. Due to the presence of nitrogen, imidazole, a heterocyclic ring has gained biological and pharmaceutical importance. Imidazole, an electron-rich moiety, possesses unique structural characteristics which have an ability for imidazole and its derivatives to bind with several enzymes receptors in biological systems. Thus, imidazole based compounds give chemotherapeutic values and can be used as clinical drugs against various diseases. Thus, the present review focus on the synthesis of imidazole and its derivatives and its biological applications such as anticancer, anti-HIV, antifungal, antitubercular, anti-bacterial, analgesic.

KEYWORDS: Imidazole, Electron rich moiety, Pharmaceutical, Biological, Clinical drug.

INTRODUCTION

Imidazole is a heterocyclic compound with 3C and 2N atom and contains N in the ring at 1st and 3rd positions. Imidazole nucleus is an important motif in many known components of human organism's viz. Vit-B12, purines, biotin and histamine. Synthetic compounds containing five member rings having nitrogen atom present in the ring structures¹ shows wide range of biological activity.

Drugs which have imidazole ring have a broader scope in remedying various dispositions in clinical medicine². Imidazole related drugs shows relatively high therapeutic properties which has brought attention towards the synthesizing a large number of novel chemotherapeutic agents. The nitrogen atoms present at the first and third positions (non-adjacent position) of the ring³, position four and five are equivalent⁴. It is also known as 1, 3-diazole. It contains two nitrogen atoms, one nitrogen bear a hydrogen atom, and the other is called pyrrole type nitrogen⁵. 1, 3-diazole ring is a bioester of the pyrazole ring⁶. It is the basic core of some natural products such as histidine, purine, histamine and DNA based structures, etc.⁷

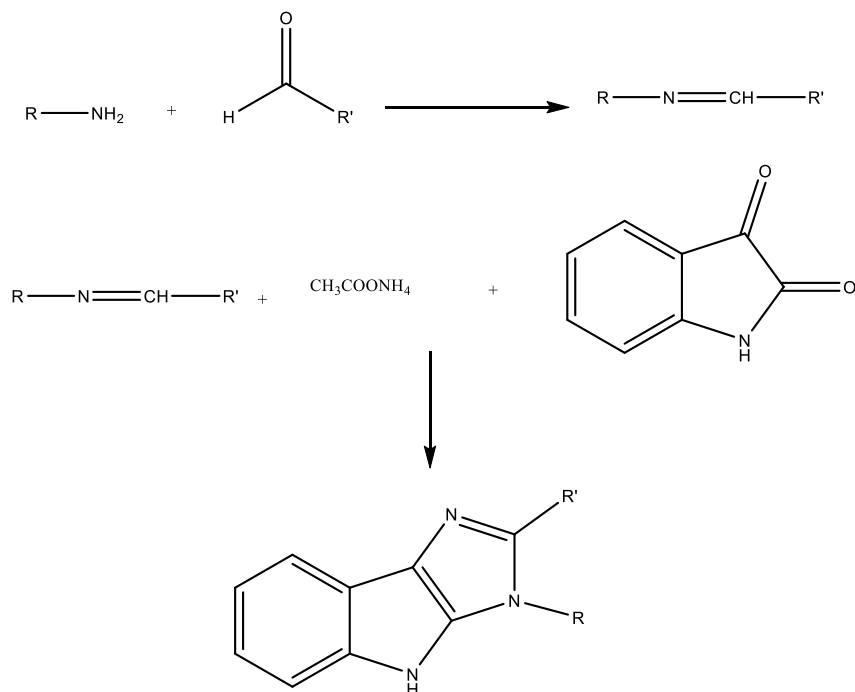
Imidazole contains two types of lone pair viz. delocalized and non-delocalized which indicates that nitrogen of 1, 3-diazole shows different dissociation constant. Hence, it can undergo electrophilic and nucleophilic reactions. Lone pair present on the second nitrogen atom is involved in the delocalization which imparts aromatic character to the imidazole ring but lone pair present on the third position of nitrogen atom is susceptible to the electrophilic attack.

German chemist Heinrich Debus reported Imidazole in 1858, even though various imidazole derivatives had been discovered as early as the 1840s. Imidazole was first prepared by condensing glyoxal, formaldehyde, and ammonia⁸. This synthesis produces relatively low yields but still it is used for generating C-substituted imidazoles. There are several ways to synthesize 1,3-diazoles and its derivatives but some common methods include Wallach synthesis, Marckwald synthesis, Debus-Radiszewski synthesis. Compounds containing 1,3-diazole moiety exhibit therapeutic activities such as antiviral, antihistaminic⁹, antidepressant¹⁰, antidiabetic¹¹, antitumor¹², antiasthmatic, antiaging, antimalarial¹³, anticoagulant, antiulcer, alpha-blockers¹⁴.

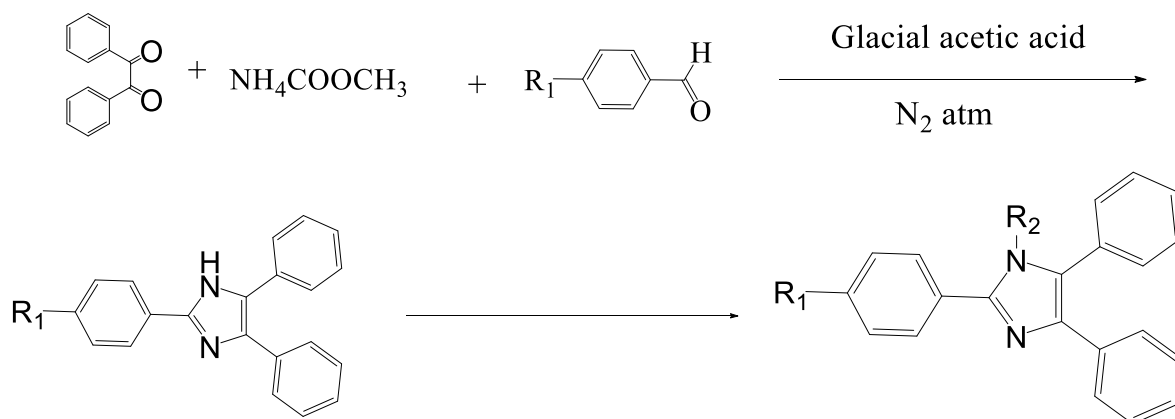
Synthesis and biological applications: Imidazole is one of the well known heterocyclic compounds which possess important feature of a variety of medicinal plants. Imidazole is white solid. Imidazole is soluble in water and other polar solvents. Also, it has presence of intramolecular hydrogen bonding. On the basis of literature survey, various synthetic procedures are available and their biological applications are possible.

Navarrete-Vazquez et. al.¹⁵ synthesized 5-(trifluoromethyl)-2-(2,3,4-trisubstituted phenyl)-1H-benzo[d]imidazole and 5-nitro-2-(2,3,4-trisubstituted phenyl)-1H-benzo[d]imidazole and in vivo antihypertensive activity was performed on spontaneous hypertensive rats (SHR) by tail cuff method, using LE 5007 automatic blood pressure computer (Leti-ca).

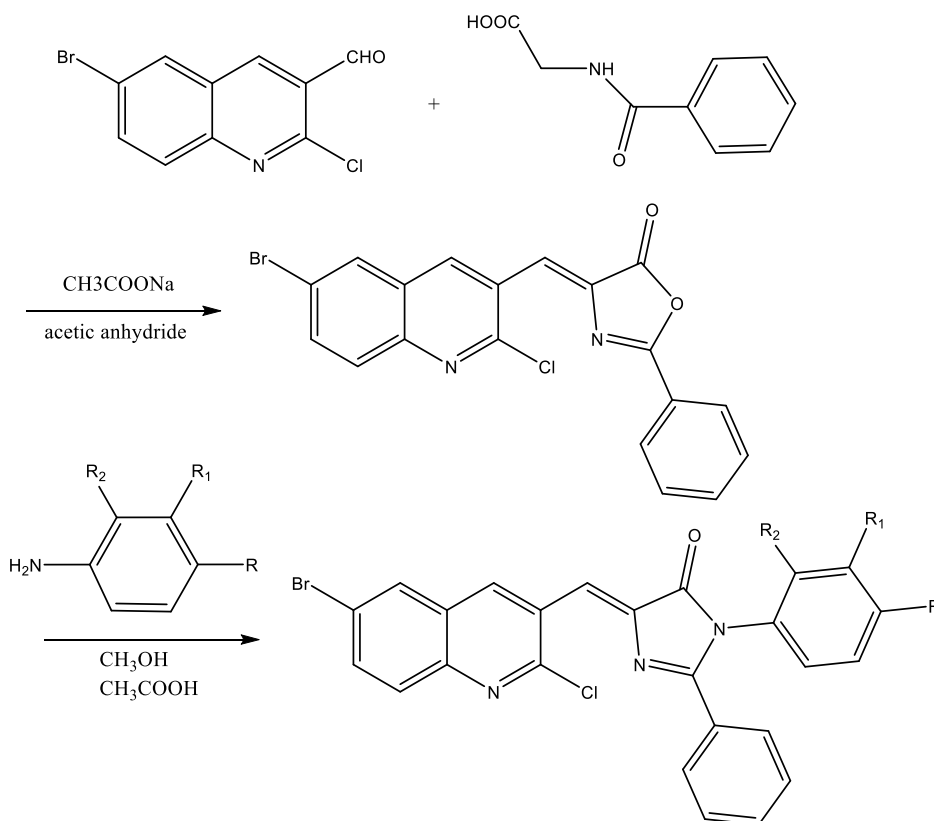
G. K. Sharma and D. Pathak¹⁶ synthesized the novel derivative of aryl imidazoles containing indole moiety in a solvent free and using microwave technique as shown in scheme 1. Synthesized substituted imidazoles evaluated for antibacterial activity against *Klebsiella pneumoniae* and *Escherichia coli*. In addition to these, it has shown significant cytotoxic activity against Ehrlich's ascites carcinoma(EAC) cell lines.



Abhishek k Jain et. al.¹⁷ synthesized 2-substituted-4,5-diphenyl-N-alkyl imidazole derivatives as shown in scheme 2 and evaluated for antimicrobial activity against *Staphylococcus aureus*, *Bacillus subtilis* and *Escheria coli* against Norfloxacin as a reference using cylinder wells diffusion technique.

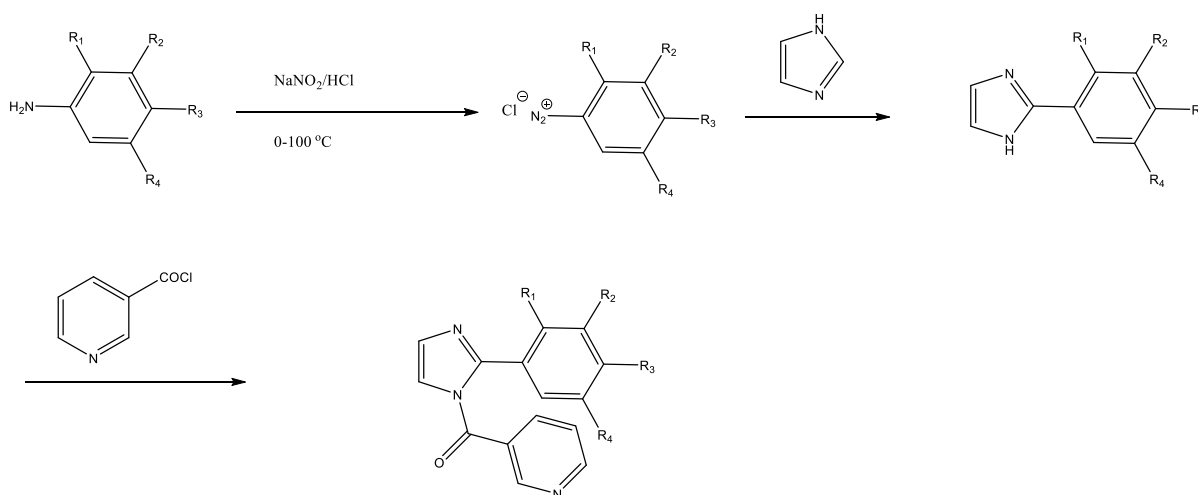


Parab RH et. al.¹⁸ have synthesized a series of oxazole and their imidazole derivatives from 6-bromo-2-chloro-3-formylquinoline as shown in scheme 3 and screened for bacterial and fungal strains such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Bacillus subtilis*, *Bacillus megaterium* and *Aspergillus niger*, *C. albicans* using agar cup borer method taking streptomycin and imidil as a reference compound.



Scheme 3

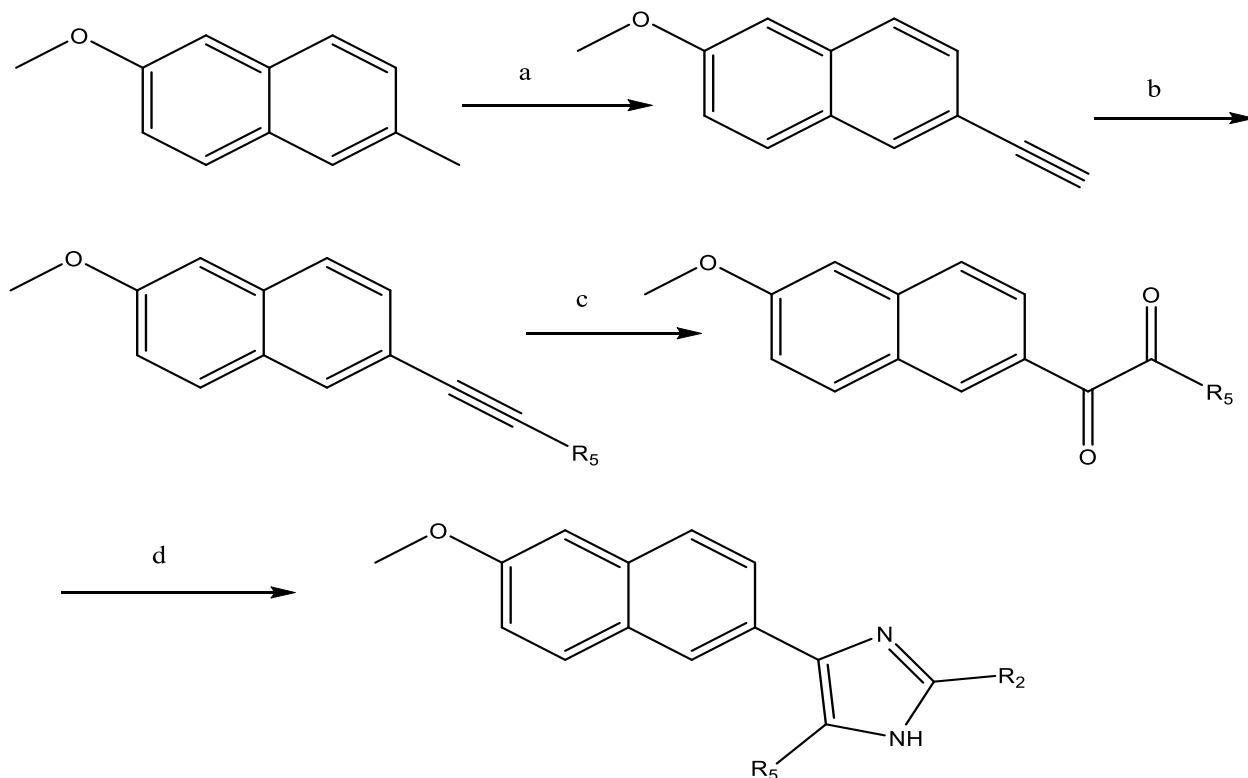
Balasubramanian Narasimhan et. al.¹⁹ synthesized a series of [2-(substituted phenyl)-imidazol-1-yl]-pyridin-3-yl-methanones as shown in scheme 4 and screened for antimycobacterial activity taking ciprofloxacin as a standard drug and [2-(substituted phenyl)-benzimidazol-1-yl]-pyridin-3-yl-methanones and evaluated for antifungal activity against *A. niger* and *C. albicans* taking Fluconazole as a reference drug.



Scheme 4

Rajasekaran et. al.²⁰ synthesized (E)-(1H-benzo[d]imidazol-1-yl)(4-substituted benzylidene)amino)phenyl-methanone and 2-(1H-benzo[d]imidazol-1-yl)-N-(5-phenyl-1,3,4-oxadiazol-2-yl)acetamide and 1-(1H-benzo[d]imidazol-1-yl)-2-((substituted-1,3,4-oxadiazol-2-yl)thio)ethanone and screened for antioxidant potential using DPPH assay.

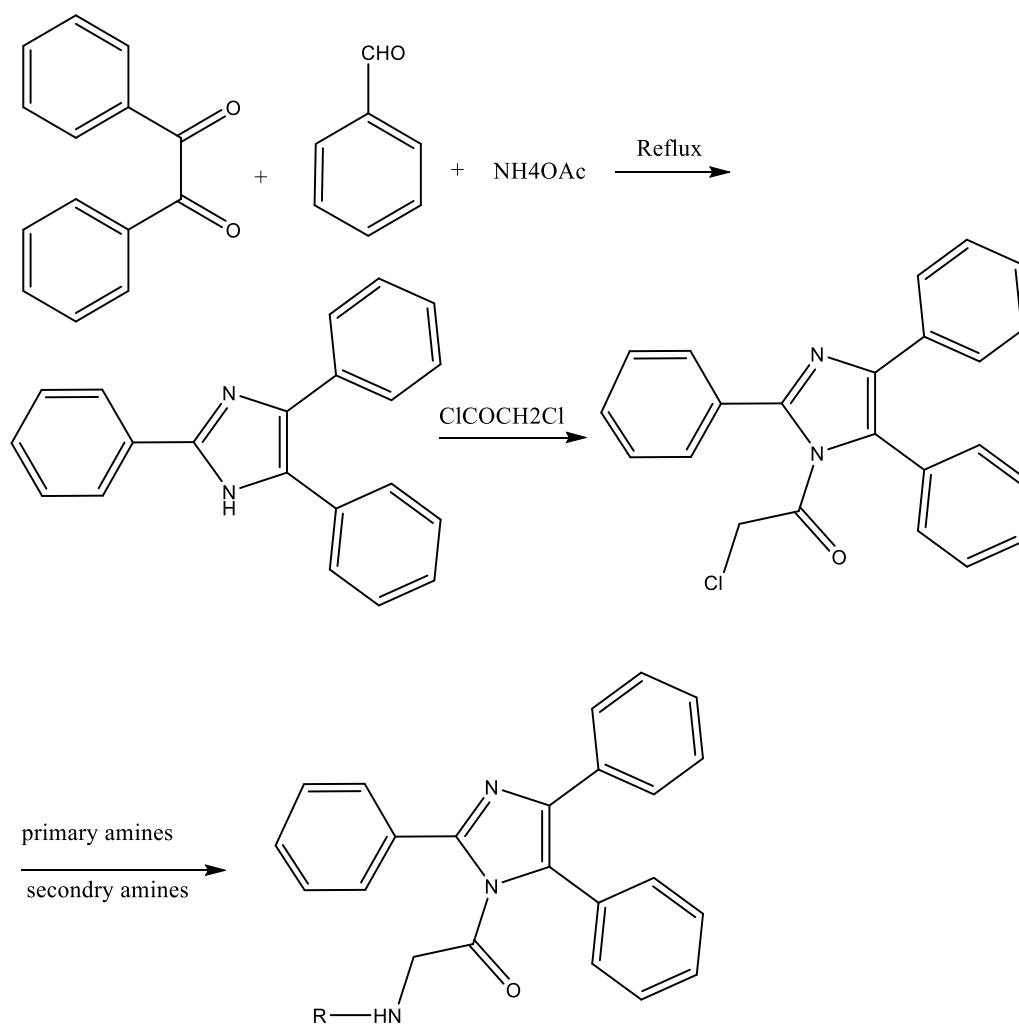
Gising et. al. [21] synthesized 2,5-disubstituted-4-(6-methoxynaphthalen-2-yl)-1H-imidazole as shown in scheme 5 and screened against *Mycobacterium tuberculosis*.



Scheme 5

Reagents and conditions: (a) ethynyltrimethylsilane, Pd(PPh₃)₂Cl₂, CuI, MeCN, diethylamine, microwave 120 °C, 15 min, then K₂CO₃, MeOH, rt, 2 h, 85%; (b) bromoaryl/heteroaryl, Pd(PPh₃)₂Cl₂, CuI, MeCN, diethylamine, microwave 80-120 °C, 15 min, 22-63%; (c) KMnO₄, phosphate buffer; (d) aldehyde, ammonium acetate, n-butanol, 50-65 °C, 0.5-5 h, 10-63%.

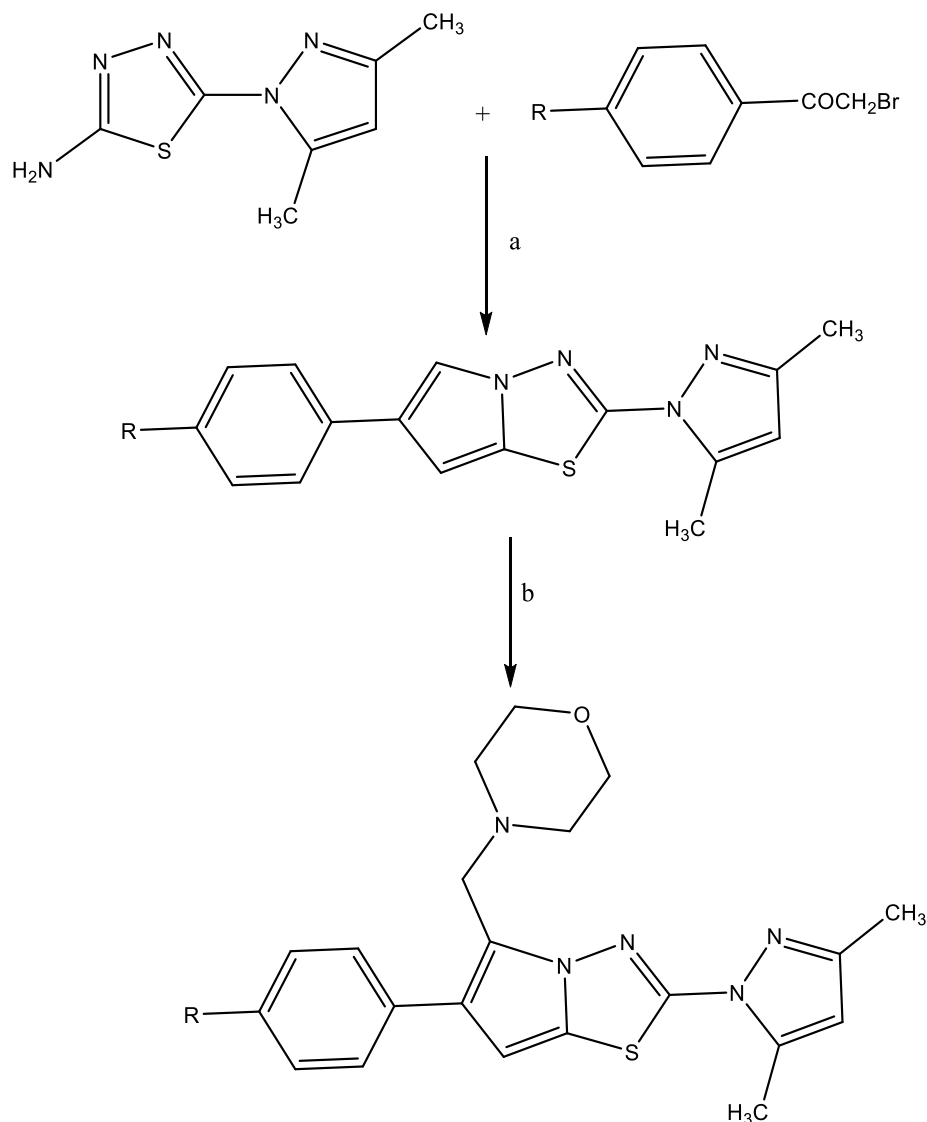
Shailesh P Zala et. al. ²² synthesized 2,4,5-triphenyl-1H-imidazole-1-yl derivatives as shown in scheme 6 and screened for antimicrobial potential against *Staphylococcus aureus* and *Escherichia coli* using ciprofloxacin as a standard.



Scheme 6

Syed et. al.²³ synthesized 6-(4-substituted phenyl)-2-(3,5-dimethyl-1H-pyrazol-1-yl)imidazo[2,1-b][1,3,4]-thiadiazole and screened against *Mycobacterium tuberculosis*.

Rangaswamy Roopashree et. al.[24] synthesized the new series of N-substituted 2-(2-butyl-4-chloro-1H-imidazole-5-yl)-1H-benzo[d]imidazole derivatives as shown in scheme 7 and evaluated for their anti-tumor activity against HeLa cancer cell line by MTT assay.



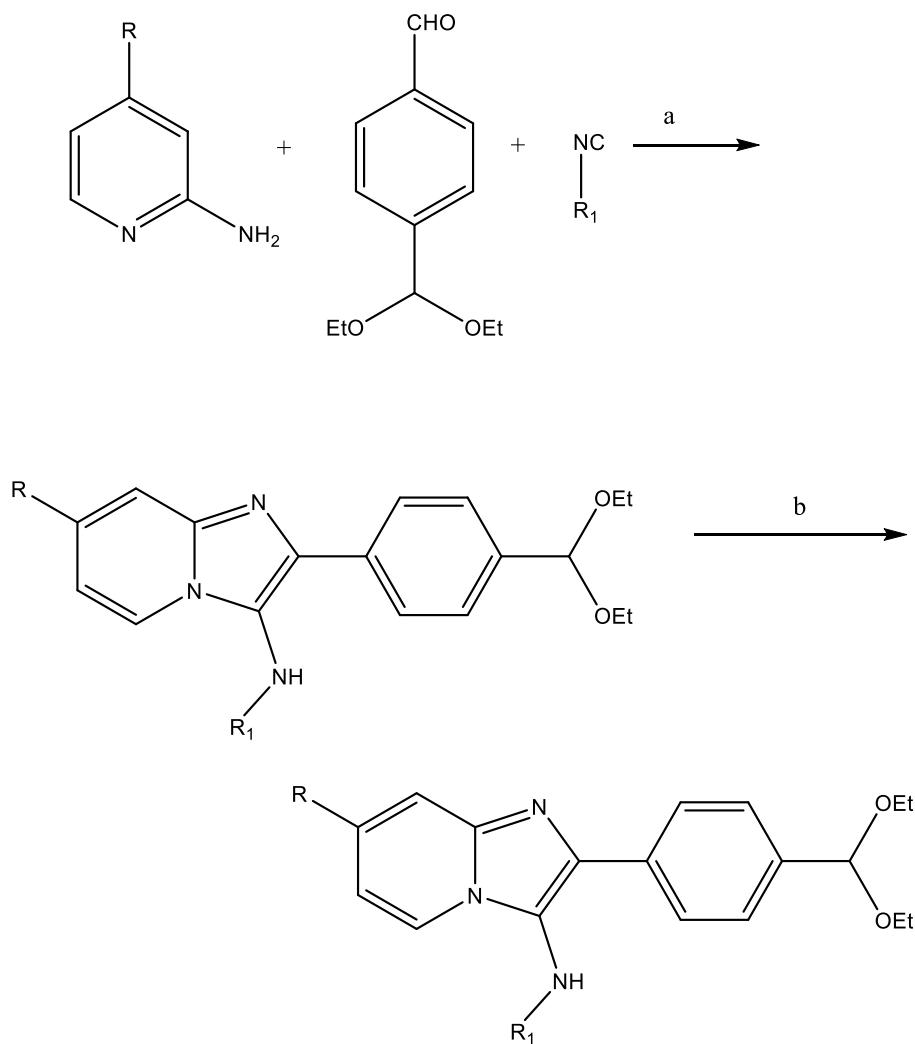
Scheme 7

Reagent and conditions: a) dry ethanol, reflux, 12 h, Na₂CO₃; (b) morpholine, HCHO, AcOH, methanol reflux 8 h.

Desai NC et. al.²⁵ synthesized N-(4-((2-chloroquinolin-3-yl)methylene)-5-oxo-2-phenyl-4,5-dihydro-1H-imidazol-1-yl)(aryl)amides by conventional as well as microwave method. Microwave method was found excellent as compare to the conventional and newly synthesized were screened for *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Candida albicans*, *Aspergillus niger*, *Aspergillus clavatus*.

Selvan et. al.²⁶ synthesized N-(2-(1H-benzo[d]imidazol-2-yl)phenyl)substituted formimidoyl and evaluated antimicrobial activity against *S. aureus* taking ciprofloxacin as a standard.

Pandey AK²⁷ synthesized a series pyrido[1,2-a]imidazo-chalcones as shown in scheme 8 and evaluated for their anti-tubercular activity against *Mycobacterium tuberculosis* H37Rv strain by MB7H10 agar medium taking Ethambutol and Pyrazinamide as a standard drug.

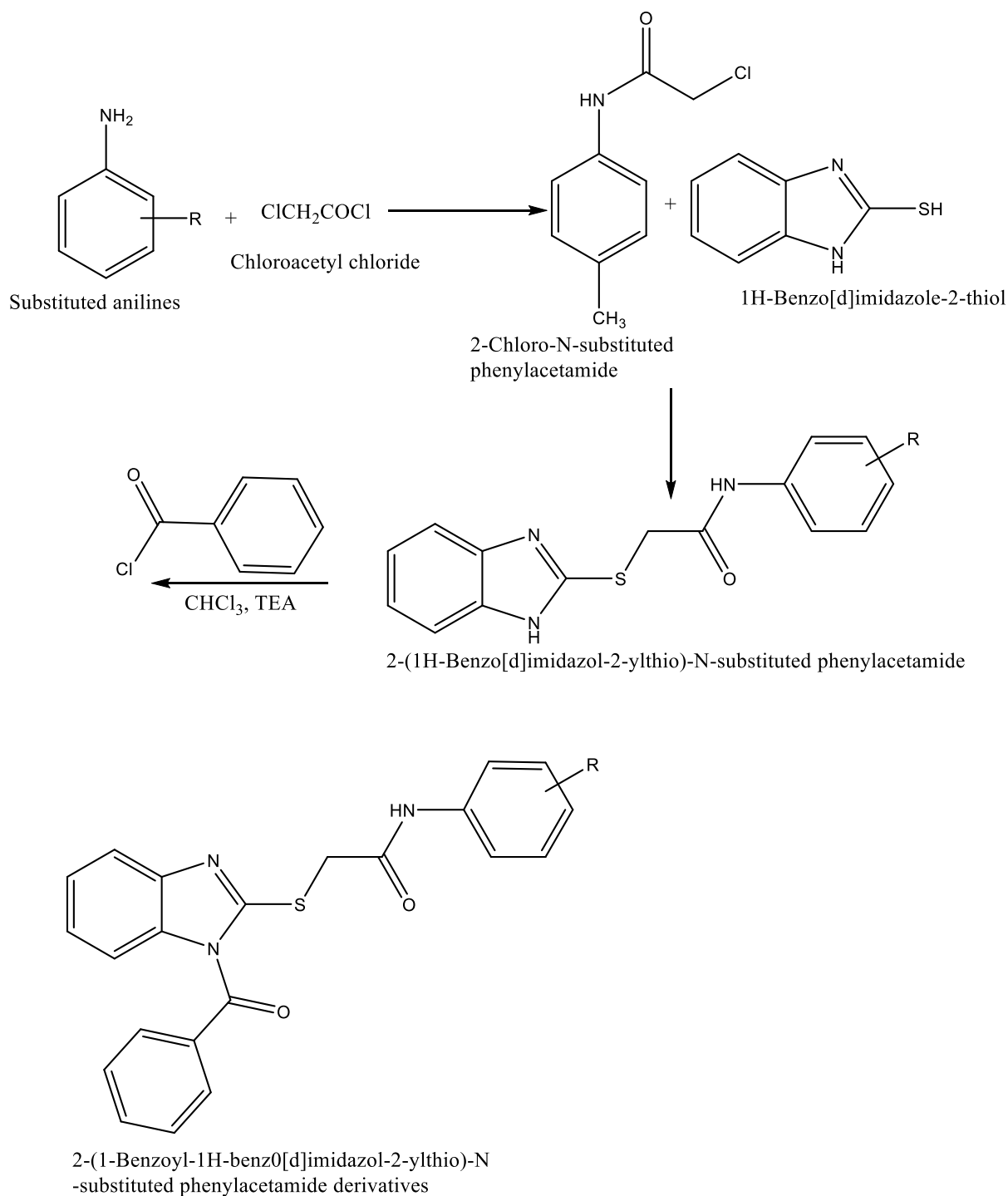


Reagent and conditions; (a) *p*-TSA (20 mol %), MeOH, rt, 10-15 h; (b) acetic acid, 90°C, 30 min.

Scheme 8

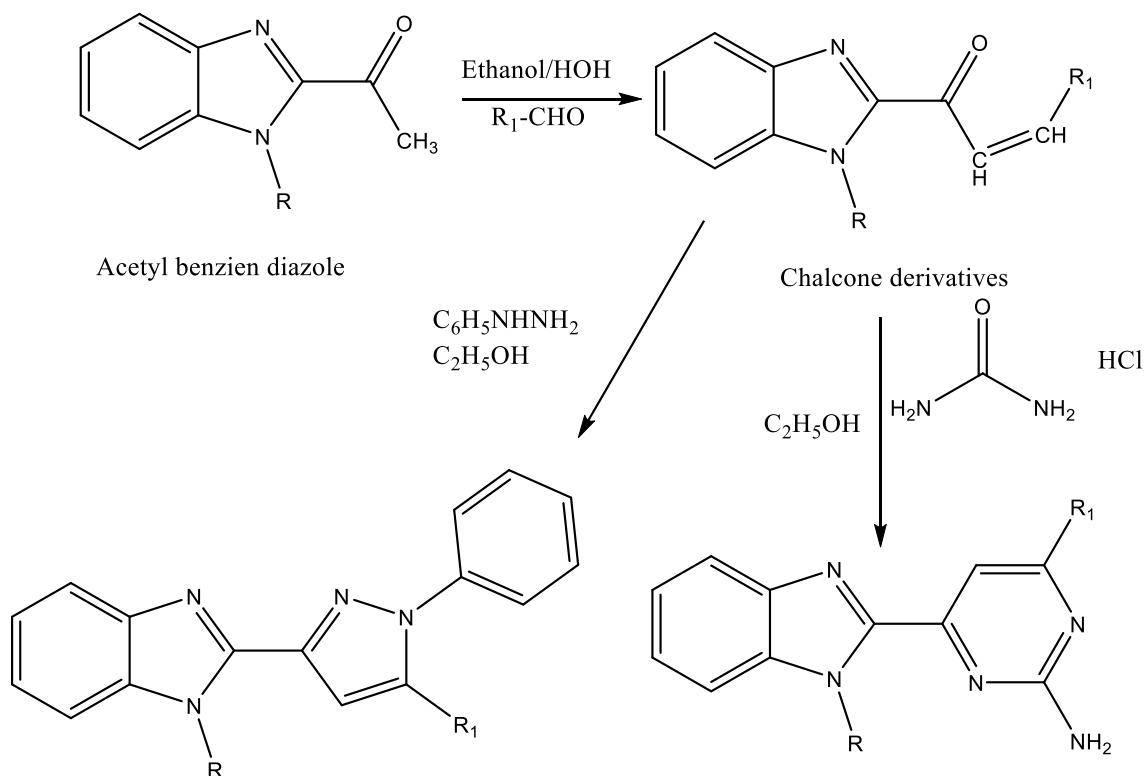
Romagnoli et. al.²⁸ synthesized 2-substituted-1-(3,4,5-trimethoxyphenyl)-1H-imidazole and evaluated for anticancer activity against different cancer cell lines such as HeLa, HT-29, A549, MCF-7, Jurkat and HL-60 using C-A4 as a standard.

Yadav et. al.²⁹ synthesized a series of 2-(1H-benzo[d]imidazol-2-ylthio)-N-(substituted 4-oxothiazolidin-3-yl) acetamides as shown in scheme 9 and screened the antibacterial activity against *Staphylococcus aureus*, *Bacillus subtilis* using Norfloxacin as a standard drug.



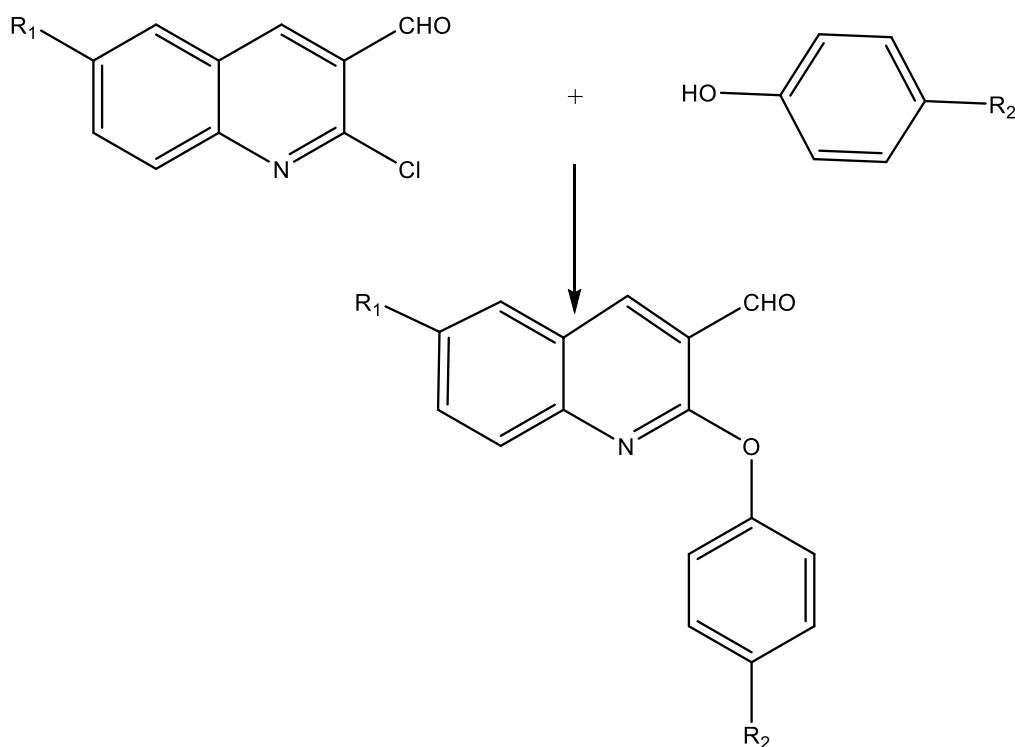
Scheme 9

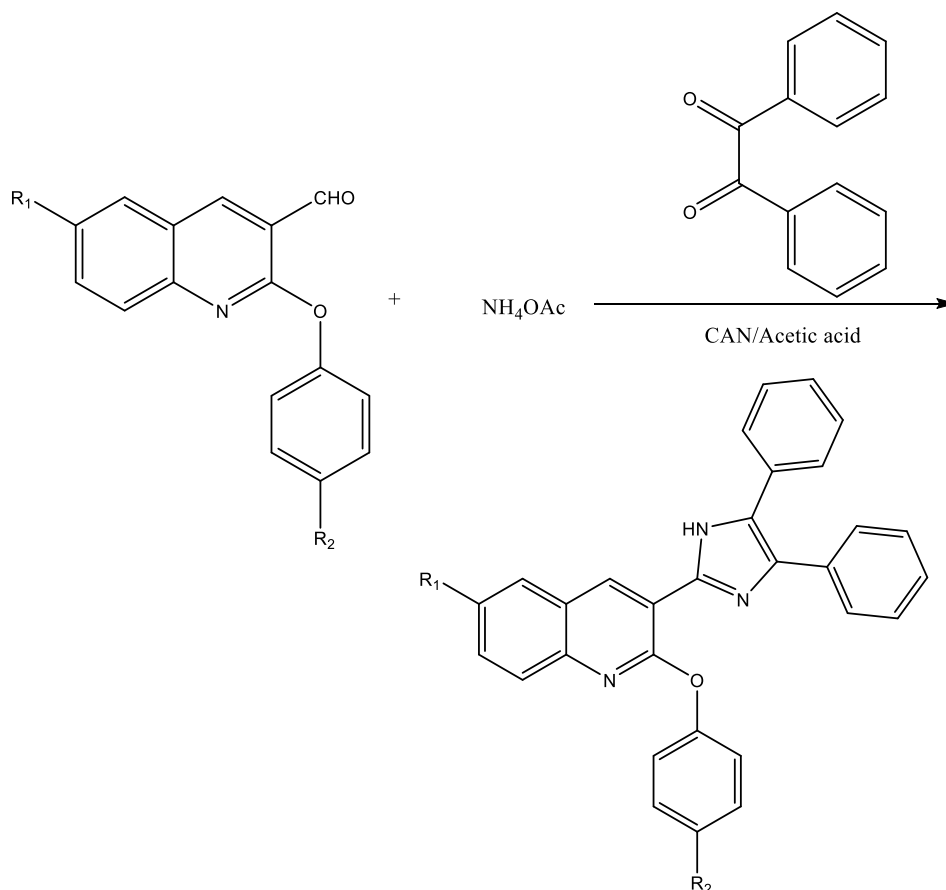
Rajendran SS et. al.³⁰ synthesized 1-substituted-2-(5-substituted-1-phenyl-1H-pyrazol-3-yl)-1H-benzo[d]imidazole and 4-(1-chloro-1H-benzo[d]imidazol-2-yl)-6-fluoropyrimidin-2-amine as shown in scheme 10 and screened for antitumor potential against different cell lines such as MCF-7 and CaCo-2 taking Fluorouracil as a standard.



Scheme 10

Shobhashana et al.³¹ synthesized 2-(4(un) substituted phenoxy)-3-(4,5-diphenyl-1Himidazole-2-yl)-6-(un) substituted quinoline as shown in scheme 11 and screened for antimicrobial activity against *Bacillus subtilis*, *Escherichia coli*, *Clostridium tetani*, *Streptococcus pneumonia* and *salmonella typhi* by using the broth dilution method.

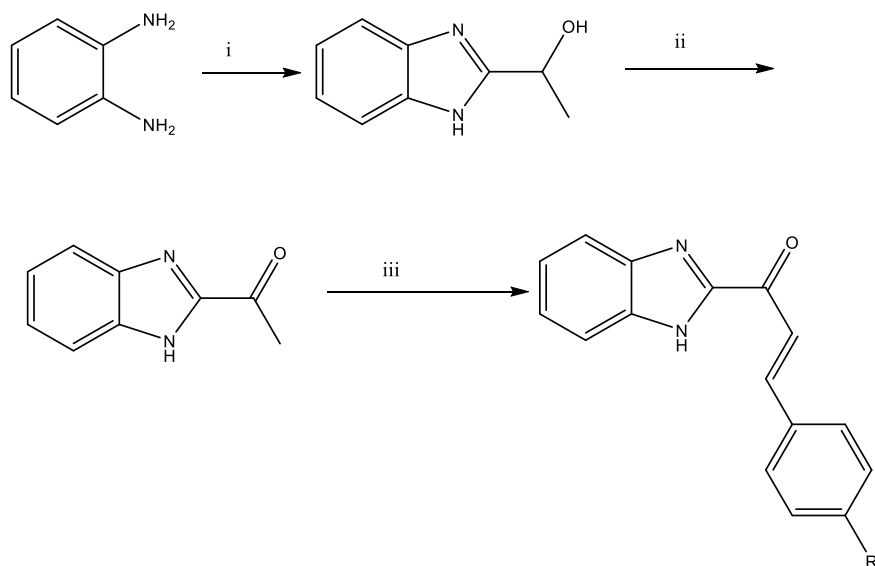




Scheme 11

Makwane et. al. synthesized³² 10-(2-Styryl-5,6-dihydro-imidazo[2,1-b] [1,3,4] thiadiazole-6-yl)-10H-phenothiazine by cyclisation of various carboxylic acid with thiosemicarbazide in presence of sulphuric acid and evaluated for antitubercular activity by agar method against Mycobacterium tuberculosis H37Rv strain using Isoniazid as reference drug.

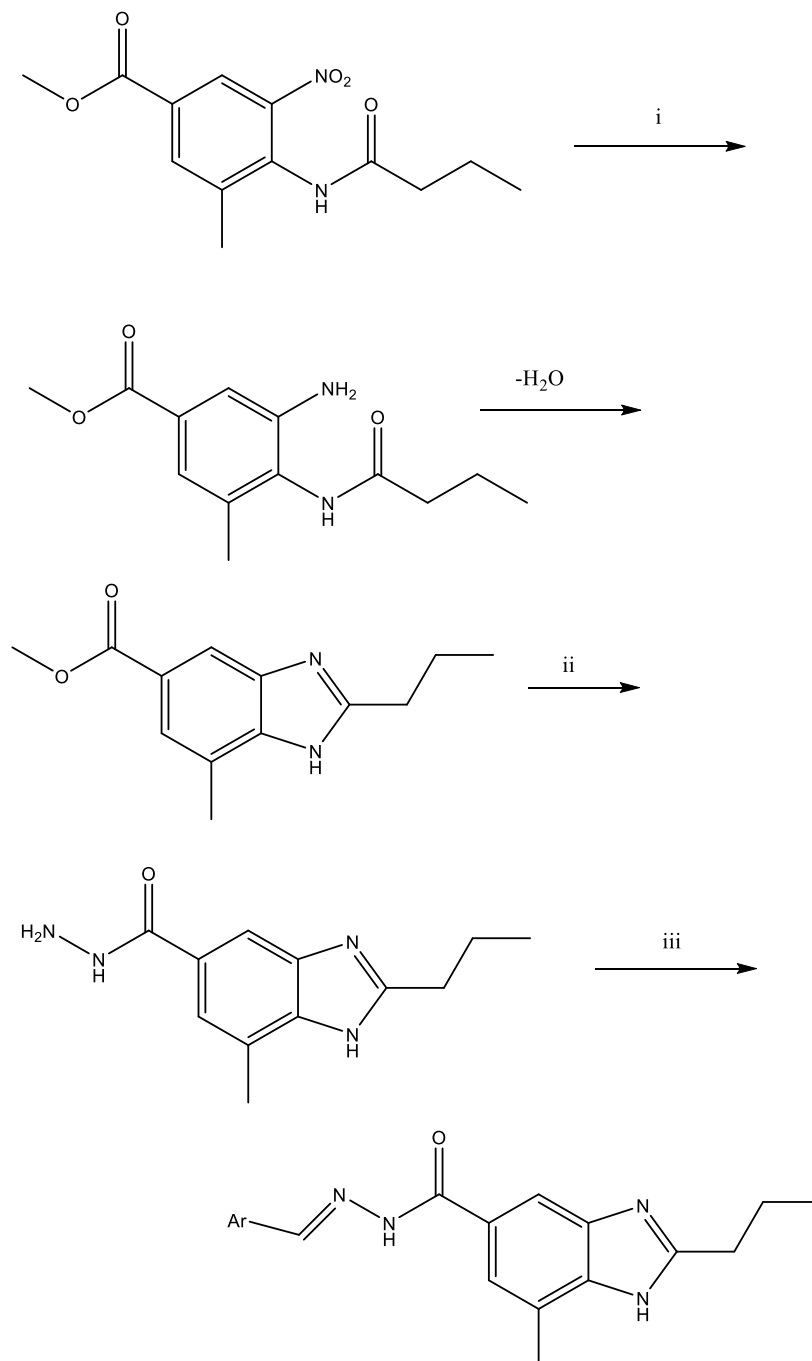
Hseih et. al.³³ synthesized (E)-1-(1-allyl-1H-benzo[d]imidazol-2-yl)-3-(4-substituted phenyl) pro-2-en-1-one as shown in scheme 12 and screened for anticancer activity against different cell lines such as A549, MCF-7, HepG2, OVCAR-3 by MTT.



Scheme 12

Reagents and conditions: (i) lactic acid (1.1 equiv), 4N HCl, reflux, 6 h; (ii) permanganate (2.5 equiv), solid aluminium oxide, no solvent, room temperature, 10 min; (iii) benzaldehyde, 40% KOH, ethanol, room temperature, 10 min; (iv) potassium carbonate, acetonitrile, reflux, overnight.

Ramamurthy Katikireddy et. al.³⁴ synthesized (E)-N⁷-Benzylidene-7-methyl-2-propyl-1H-benzo [d]imidazole-5-carbohydrazides (5a-r) from 7-methyl-2-propyl-1H-benzo[d]imidazole-5-carbohydrazide (3) by condensing with different aromatic aldehydes as shown in scheme 13 and evaluated for antioxidant activity.

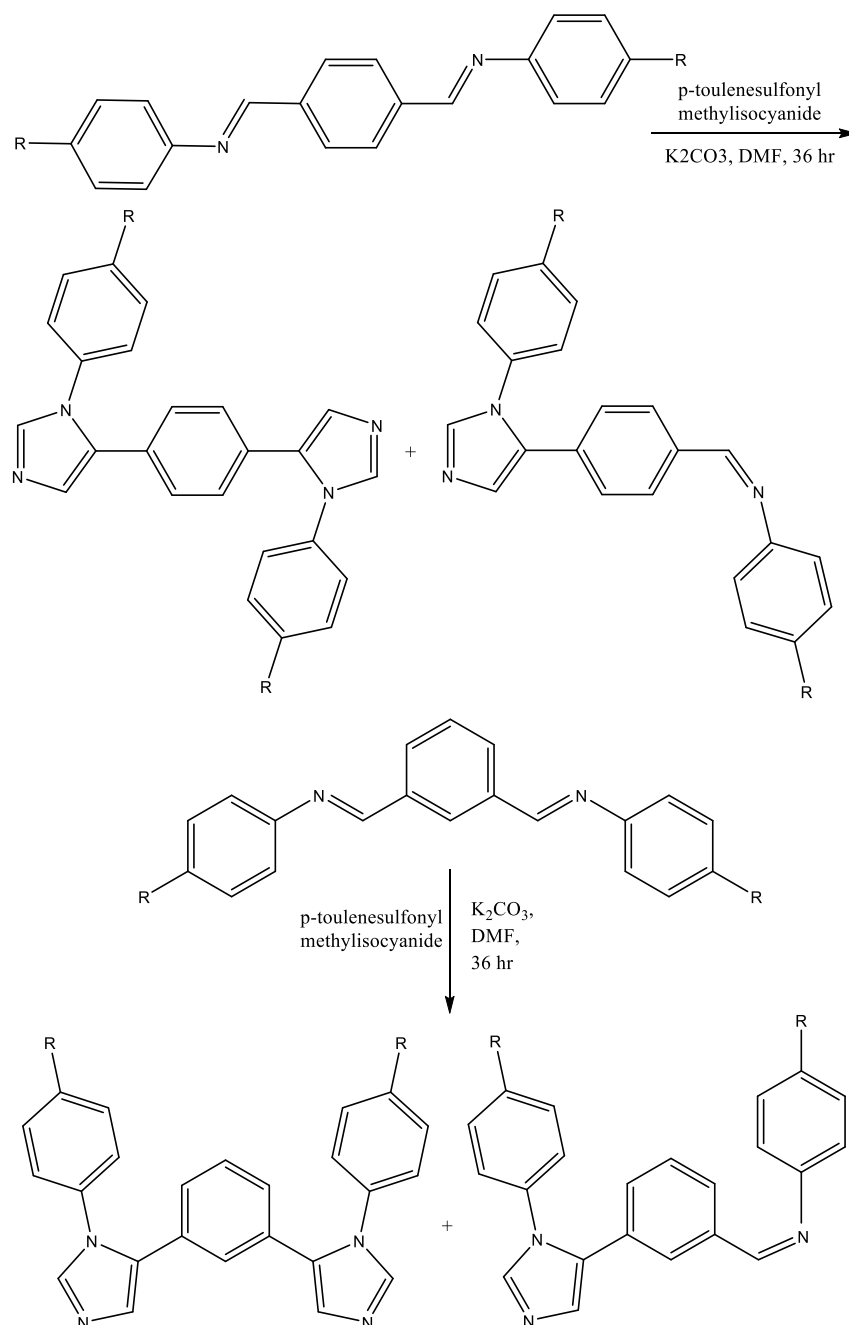


Reagents and conditions: (i) Na₂S₂O₄, H₂O, reflux, 4 h, 86% (ii) N₂H₄-H₂O, ethanol, reflux, 10 h, 90% (iii) Ar-CHO (4a-r), gla.AcOH, MeOH, reflux, 4-6 h, 88-92%.

Scheme 13

Meenakshisundaram et al.³⁵ developed 3-(4- substituted benzyl)-6,7-disubstituted-2-(4-(6,7-disubstituted-3-(4-substitutedbenzyl) imidazo[1,2-a] pyridin-2-yl)phenyl)imidazo[1,2-a]pyridine, 3-(4-substituted benzyl)-2-(3-(6,7-disubstituted-3-(4-substitutedbenzyl)imidazo[1,2-a]pyridin-2-yl)phenyl)-6,7-disubstitutedimidazo[1,2-

a]pyridine and 6,7-disubstituted-3-(4-substitutedbenzyl)- 2-phenylimidazo[1,2-a] pyridine as shown in scheme 14 and screened for antitumor potential against diferent cell lines such as HeLa, MDA-MB-231 and ACHN by SRB method using adriamycin as a standard.



Scheme 14

CONCLUSION

In the present review article, we have summarized various synthetic methods for the preparation of imidazole and its derivatives. From this study, we have found that there is need for synthetic methods which are ecofriendly. Also, this study has focused on the wide range of biological activities viz. anticancer, antitubercular, antifungal, analgesic and anti-HIV, antioxidant, etc. Thus, this article reveals that imidazole is an important motif in the heterocyclic chemistry which needs much modification or derivatization to develop and design highly effective biological compounds.

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SOME HYDRAZONE METAL ION CHELATES ACTS AS CORROSION INHIBITOR.

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Abstract: Corrosion is a serious problem associated with every use of metal. The damage by corrosion result in highly cost for maintenance and protection of materials used. It is a constant and continuous problem, often difficult to eliminate. But we can retard processes of corroding or prevent. In this study we have used some metal ion chelate to find the corrosion inhibition activity of some hydrazone metal ion chelate and from result conclude that they acts as corrosion inhibitor.

Introduction:

Corrosion is the deterioration of metal by the chemical reaction when metal comes in contact with the atmosphere or moisture there is an oxidation reduction processes¹. Corrosion of metals is a constant and continuous problems often difficult to eliminate². The use of inhibitor is one of the most practical methods for protection against corrosion³⁻⁶. Corrosion inhibitor are chemical compound which is used in small quantities can retard the degradation of metals in hostile tenvironmen⁷. Literature serve shows that many synthetic compound are acts as inhibitors mainly depend on some physic-chemical properties of molecule related to its functional group to the possible steric effect and electronic density of the atoms, adsorption is also supposed to depends on the possible interaction of pi orbital of the inner orbital with d orbital of the surface atom, which induce greater adsorption of the inhibitor molecule on the surface of C- steel, leading to the formation of corrosion protection film^{8,9}. The organic molecule adsorb on the metal surface through heteroatom, such as nitrogen, oxygen, and sulphure blocking the the active site and generating a physical barrier to deduced the transport of corrodible species to metal surface¹⁰⁻¹⁴. Schiff vase compound and their metal complex acts as anti- corrosion agent¹⁵⁻¹⁶. Some Schiff base compound have recently been reported as effective corrosion inhibitors for mild steels^{17,18}.

In present work used metal ion complexes are already reported method of synthesis and characterization of metal complexes are published in research journal. Only effect of corrosion inhibition property mention here.

Chemistry of corrosion.

Corrosion reaction is electrochemical in nature. They involve the transfer of charged ions across the surface between a metal and the electrolyte solution in which it is immersed. There are two types of electrode reactions occurring at the metal surface i) Anodic ii) Cathodic.

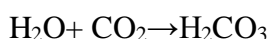
Consider the corrosion consisting of formation of rust on iron. Oxygen gas and water must be present along with iron to rust. Some part of metal surface serves as anode where oxidation takes place.



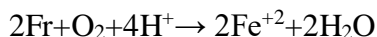
The electrons given up by iron reach another region of the same metal surface, where oxygen of air is reduced to water by H^{+} ions as



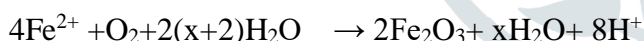
The reduction reaction occurs in an acidic medium. The origin of H^{+} ions is carbonic acid formed by atmospheric carbon dioxide and moisture or water



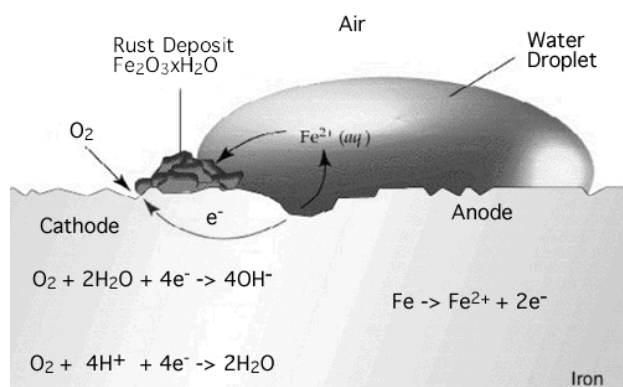
The net corrosion reaction is obtained by adding two reactions.



The oxidized Fe^{+2} ions are further oxidized by oxygen in presence of water into the rust in the form of hydrate ferric oxide.



Mechanism of rusting.



It is well known in surface chemistry that surface reaction are strongly affected by the presence of foreign molecules. Corrosion process, being surface reaction can be controlled by a compound known as inhibitors which adsorb on the reacting metal surface. The term adsorption refers to molecules attached directly to the surface, normally only one molecular layer thick and not penetrating into the bulk of the metal itself. The technique of adding inhibitor to the environment of metal is well known method of controlling corrosion. The inhibiting compound contributes to the formation of thin layer on surface which stifles the corrosion process.

Inhibition is one of the most important application in the corrosion process. Inhibitor protect the metal by adsorbing onto the surface and retard metal corrosion in aggressive environment. Selecting the appropriate inhibitor for specific environment and metal is of great importance, since an inhibitor that protect one particular metal may accelerate the corrosion of another. A survey of literature reveals that the applicability of organic compound as corrosion inhibitors for steel has been recognized for long time. A large number of organic compounds, particularly those containing nitrogen, oxygen or sulphur in a conjugated system are known to be applied as inhibitors to control corrosion of iron and steel. The inhibition process has been shown to occur via inhibitor adsorption isothermal and the efficiency of the inhibitor strongly depend on the structure and chemical characteristic of the adsorbed inhibitor layer formed under particular experimental condition. It has been reported that the adsorption of an organic compound onto the surface of metal is dependent on the following properties of the inhibitor molecule such as steric factors, functional group, electron density at the donor atoms and π orbital character of donating electrons and on the nature of substrate metals and the type of interaction between organic molecules and the metallic surface. In other word the efficiency of an organic compound as corrosion inhibitor depends not only on the characteristics of the environment in which it acts the nature of the metal at the interface, but also on the structure of the inhibitor itself

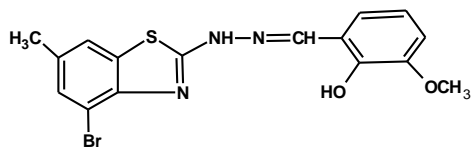
, which includes the number of adsorption active centers in the molecule, their charge density in the molecular size, the mode of adsorption, the formation of metallic complexes and projected area of the inhibitor on the metallic surface.

In the present work we studied the effect of heterocyclic compound and its metal complexes on corrosion.

Experimental

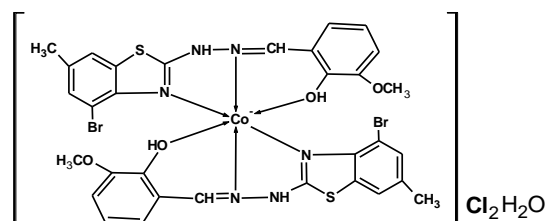
In this experiment one ligand and their three metal ion chelates are used which are previously reported. Structure of ligand (refer as CBMBTH) and metal ion chelates are as follows.

Structure of ligand

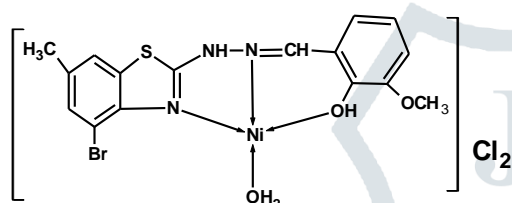


(2-(2'-hydroxy-3'-methoxyphenyl)-4-bromo-6-methyl benzothiazolyl hydrazon.)

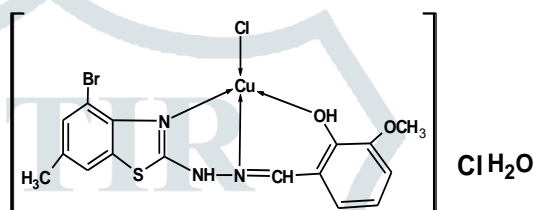
This ligand is referred as HMPBMBTH



structure of $[Co(HMPBMBTH)_2] Cl_2 H_2O$



structure of $[Ni(HMPBMBTH) H_2O] Cl_2$



structure of $[Cu(HMPBMBTH) Cl] Cl H_2O$

For the study of anti-oxidative effect of ligand and its metal complexes, steel wire is used for the experiment. Wire is purchased from local market. First of all wire is cleaned by regmal paper (sand paper) then it is washed with distilled water and cleaned by filter paper. Then it is dried in oven. Then near about length of 3.5 cm pieces are made by cutter. Its weight are taken on digital one pan balance. In second step 0.5 N solution of H_2SO_4 is prepared and standardized by NaOH. then 5 beaker beakers of 100 ml taken, they are cleaned with distilled water and dried. Labeled them by number 1 to 5. In each beaker contain 10 ml of 0.5 N H_2SO_4 acid. In addition to this beaker number 2 contain legend (HMPBMBTH). In beaker number 3,4,5 contain metal complexes Co, Ni, Cu of ligand (HMPBMBTH) respectively. In each beaker added metal pieces which is previously weighed and kept it for 48 hours. After 48 hours metal pieces are taken out and cleaned with water and followed filter paper and its weight are taken. Weight of metal wire pieces before experiment, after experiment, loss in weight, % loss is calculated by usual method. % inhibition efficiency is calculated by using following formula

$$I. E. = \frac{W_u - W_i}{W_u} \times 100$$

Where

I. E. = Inhibition Efficiency.

W_i = Loss in weight in inhibitor solution.

W_u = weight loss in control solution.

Result and discussion

| Sr. No. | Compound | Initial wt. | Final wt. | Loss in wt.. | % Loss in wt. | I.E. |
|---------|---|-------------|-----------|--------------|---------------|--------|
| 1 | control | 1.523 | 1.306 | 0.217 | 14.258 | -- |
| 2 | HMPBMBTH | 1.752 | 1.538 | 0.214 | 12.214 | 14.016 |
| 3 | [Co(HMPBMBTH) ₂] Cl ₂ | 1.631 | 1.518 | 0.113 | 6.928 | 51.017 |
| 4 | [Ni(HMPBMBTH) ₂ Cl] Cl H ₂ O | 1.372 | 1.275 | 0.094 | 6.851 | 51.916 |
| 5 | [Cu(HMPBMBTH)H ₂ O]Cl | 1.404 | 1.302 | 0.102 | 7.264 | 50.280 |

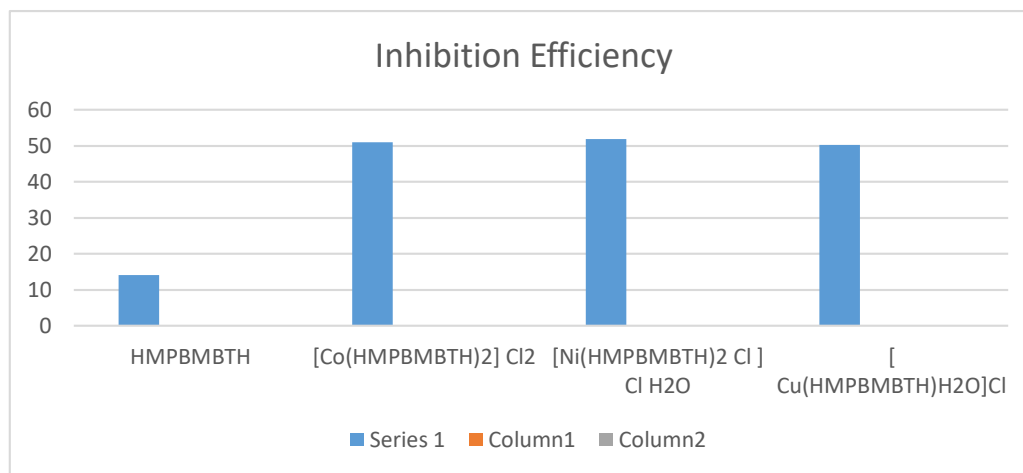
Table no. 1

| Sr. No. | Compound | I.E. |
|---------|---|--------|
| 1 | HMPBMBTH | 14.016 |
| 2 | [Co(HMPBMBTH) ₂] Cl ₂ | 51.017 |
| 3 | [Ni(HMPBMBTH) ₂ Cl] Cl H ₂ O | 51.916 |
| 4 | [Cu(HMPBMBTH)H ₂ O]Cl | 50.280 |

Table -2

From the observation table it indicates that ligand as well as metal complexes have corrosion inhibitive properties.

Among the metal complexes the $[\text{Ni}(\text{HMPBMBTH})_2 \text{Cl}] \text{Cl} \cdot \text{H}_2\text{O}$ most corrosion inhibitor and the complexes $[\text{Cu}(\text{HMPBMBTH})\text{H}_2\text{O}]\text{Cl}$ least inhibitive property. $[\text{Co}(\text{HMPBMBTH})_2] \text{Cl}_2$ Complex is medium corrosion inhibitor. Inhibition efficiency can be represented graphically as bellow



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PREPARATION AND CHARACTERIZATION OF Ni⁺⁺ and Cu⁺⁺ METAL IONS CHELATES WITH HETEROCYCLIC MOLECULES

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ABSTRACT

The transition Metal ion chelates of Cr⁺³, Mn⁺² is synthesized by using 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones and characterized by different analytical procedure and spectral study. These metal ion chelates are insoluble in common organic solvents. Infrared spectrum showed the bonding through azomethazine N and ring N.

Keywords -metal ions chelates, benzothiazolyl Hydrazones

Introduction

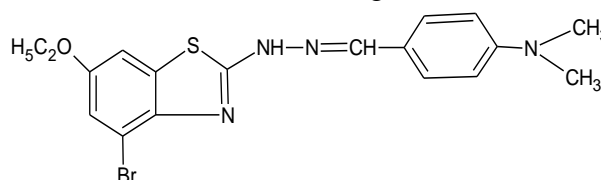
The coordination chemistry of hydrazones is an intensive area of study and numerous metal complexes of these ligand have been investigated¹. The development of the field of bioinorganic chemistry has increased the interest in Schiff base complexes, since it has been recognized that many of these complexes may serve as models for biologically important species²⁻⁴. The hydrazones metal complexes have found application in various process like sensor, medicine, nonlinear optics etc. they are well known for their metal binding ability and exhibit interesting coordinating behavior with transition metal ion^{5,6}. Coordination compound derived from aryl hydrazones have been reported because of their anti-tuberculosis, antimicrobial and corrosion inhibitor⁷⁻⁹. Hydrazones have been drawing much attention from coordination chemistry to transition metal¹⁰. In the context of the above application we have tried to the synthesis and characterization of transition metal complexes of 2-(4'-dimethyl amino phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones. Prepared complexes were dried and the physical and chemical properties were recorded. Analysis of the complexes and different spectral studies like I.R., Electronic spectra of the complex were used for find out the donor site of the ligand.

Synthesis of ligand

Preparation of 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones from 4-bromo-6-ethoxy benzothiazolyl hydrazones.

To the ethanolic solution of 4-bromo-6-ethoxy benzothiazolyl was added in ethanolic solution of 4-dimethylaminobenzaldehyde. The mixture was refluxed on water bath for two hours. Obtained solid is cooled filtered, washed with ethanol and recrystallized from hot benzene.

Structure of ligand.



2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones
Physical parameter-

Synthesis of complexes

Synthesis of Ni⁺² metal complex with 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones 150 ml of 0.2 M solution of 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones were prepared in alcohol and 100 ml of 0.1 M solution of NiCl₂ prepared in alcohol. These two solution were mixed in 500 ml flask, the pH is maintained up to 6.5 by addition of buffer solution. The reaction mixture is were refluxed for one hour. precipitate is obtained, it is digested after cooling it is filtered through Buckner funnel. The precipitate is purified by washing with ether, the complex were dried by keeping it in oven. The product was packed into sample bottle.

Synthesis of copper complex

copper chloride and ligand 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones were dissolved

separately in ethanol so as to prepare 0.1 molar solution with constant stirring. A clear solution of copper chloride was mixed in ligand solution in 1:2 proportion and pH is adjusted to 6.5 with buffer solution and refluxed on water bath for one hour and allowed to cool. The contents were digested for one hour and filtered. Pale green colored solid is obtained it washed with ethanol and dried and stored in bottle.

Physical parameter and elemental analysis.

Decomposition point was determined with the help of melting point apparatus by open capillary methods. M:L ratio was determined by heating known weight of complex in platinum crucible. Metal ion percentage in a complex is determined by E.D.T.A. titration method. Chloride is estimated by Mohr's method.

Physical parameter and analytical data of the Ni(II), Cu(II) complexes and ligand 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones (MAPBEBTH). Are given in table no. 1. metal ligand ratio and empirical formula were assigned on the basis of T.G.A. measurement and elemental analysis is given in table no.5.2.

Characterization of complexes

spectrophotometer at range 200-800 nm by using D.M.S.O. solvent at P.G. department of chemistry Shivaji University Kolhapur. I.R. spectra of ligand were recorded at Yeshwant Mahavidyala Nanded and I.R. spectra of complexes are recorded at PERKIN ELMER spectrum-100/79720 by KBr platelate method at Shivaji University Kolhapur. Thermo gravimetric analysis (T.G./D.T.A.) measurement are recorded on thermo gravimetric analyzer on TA model S.T.D-2960 at Shivaji University Kolhapur in Nitrogen atmosphere .XRD pattern of the complexes recorded on PW-3719/1710 Philips –Holland spectrometer at Shivaji University Kolhapur and E.S.R. is recorded at IIT, pawai, Mumbai.

Result and discussion

The complexes of Ni(II), Cu(II), are prepared with the ligand 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones (MAPBEBTH). This complexes are colored. These complexes are soluble in D.M.S.O. but insoluble in water, alcohol, chloroform, and D.M.F. Decomposition point of complexes are in the range of 240-300°C . It suggest that they have good thermal stability at room temperature

Table.1: physical property of (MAPBEBTH) metal complexes.

| Complex | color | D.P. | Yield% | %Cl |
|---|------------|---------|--------|--------|
| [Ni(MAPBEBTH) ₂] Cl ₂ H ₂ O | Pale green | 263-267 | 68 | 7.200 |
| [Cu(MAPBEBTH)Cl H ₂ O] Cl. | Sky blue | 252-257 | 73 | 12.418 |

Table.2: Percent C,H,N and metal ion in HMPBMBTH metalcomplex

| compound | M.wt | Empirical formula | %C | %H | %N | %M |
|---|--------|---|--------|-------|--------|--------|
| MAPBEBTH | 419.20 | C ₁₈ H ₁₉ N ₄ BrSO | 51.576 | 4.532 | 13.365 | - |
| [Ni(MAPBEBTH) ₂] Cl ₂ H ₂ O | 986.11 | C ₃₆ H ₄₀ Cl ₂ Ni ₈ S ₂ Br ₂ O ₃ | 43.850 | 4.056 | 11.357 | 5.953 |
| [Cu(MAPBEBTH)Cl H ₂ O] Cl. | 571.74 | C ₁₈ H ₂₁ Cl ₂ Ni ₄ SBrO ₂ | 37.791 | 3.672 | 9.794 | 11.113 |

U.V. Spectroscopy

U.V. and visible spectra of complexes and ligand recorded on U.V. SHIMADZU UV3600 spectrophotometer at range 200-800 nm by using D.M.S.O. solvent at P.G. department of chemistry Shivaji University Kolhapur.

The ligand 2-(4'-dimethylamion phenyl)-4-bromo-6-ethoxy benzothiazolyl hydrazones has exhibited one characteristic maxima in U.V.

region at 246 nm where in [Ni(MAPBEBTH)₂] Cl₂ H₂O complex it is shifted at 258 nm and in complex [Cu(MAPBEBTH)Cl H₂O] Cl. Band is observed at 266 nm this shifting of band is due to the complex formation.

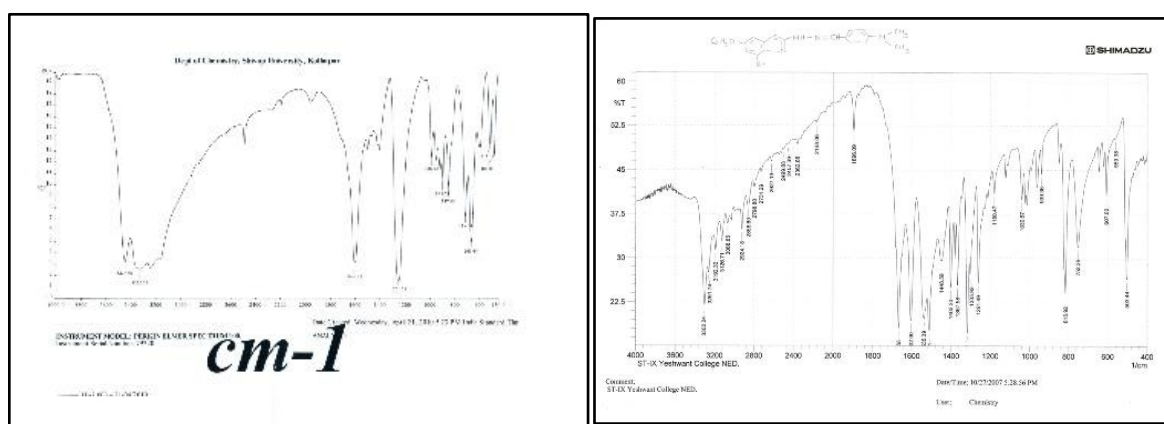
I.R. spectra

A sharp strong band is observed in I.R. spectra of ligand at 1665 in ligand it is due to the C=N

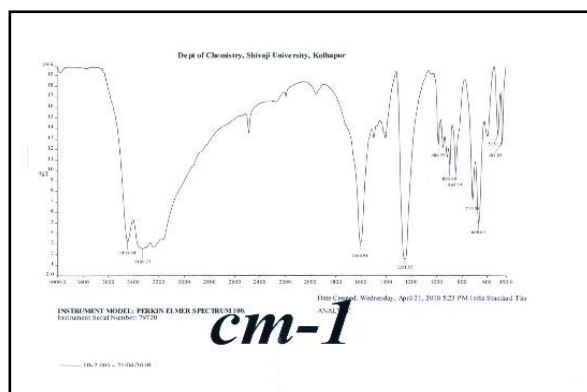
of thiazole ring nitrogen. This band is shifted in Ni^{+2} complex as well as in Cu^{+2} complex. In Ni^{+2} complex it is observed at 1645 and in Cu^{+2} complex it is observed at 1606 this shifting of band in both complexes it indicate that the Nitrogen of thiazole ring is involve in the complex formation. Another band is observed at 1602 in ligand. This band is support to the presence of C=N (azomethazine) group in ligand. This band is shifted in Ni^{+2} and Cu^{+2} complexes. The band is observed in Ni^{+2} complex at 1590 where in Cu^{+2} complex it is observed at 1510. This shifting of band indicate that the azomethazine nitrogen involve in the complex formation.

One band is observed at 3302 in ligand it may be due to the presence of N-H group. This band is also observed in Ni^{+2} and Cu^{+2} complexes it is evidence that the N-H group is not involve in the complex formation. In Cu^{+2} complex one band is observed at 3606 which is absent in ligand and in Ni^{+2} complex. it indicate that the water molecule is coordinate with metal.

Another one band is observed in both complexes but absent in ligand. In Ni^{+2} complex it is observed at 481 where as in Cu^{+2} complex it is observed at 468 it indicate that there is a formation of M-L bond.



Thus the ligand act as a bidentate. It coordinate through azomethazine, Nitrogen of thiazole ring.



*I.R. Spectra of Ligand MAPBEBTH. I.R. Spectra of $[\text{Ni}(\text{MAPBEBTH})_2] \text{Cl}_2 \cdot \text{H}_2\text{O}$
I.R. Spectra of $[\text{Cu}(\text{MAPBEBTH})\text{Cl} \cdot \text{H}_2\text{O}] \text{Cl}$*

Electron spin Resonance Spectroscopy

The X-band E.S.R. spectrum of the powder Ni(II) and Cu (II) complexes was recorded at room temperature. The calculated values of Ni(II) is g_{\parallel} , g_{\perp} , g_{avg} , and G are 2.18171, 2.08286, 2.11581, 4.26457 respectively. And Cu(II) is g_{\parallel} , g_{\perp} , g_{avg} , and G are 2.21932, 2.06947, 2.11942, 4.288792 respectively. The values are typical for one unpaired electron in an orbital of mostly d_{xy} character. If g_{\parallel} value is less than 2.3 the compound is covalent and g_{\parallel} value is greater than 2.3 then it is ionic. Present values indicate that the complexes are covalent. G value is greater than 4 it indicate that the ligand is weak field ligand.

Thermal analysis

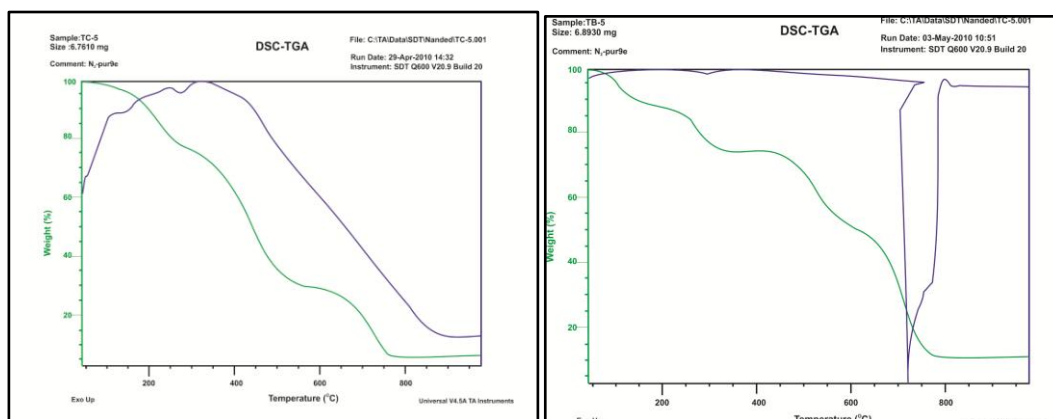
Results of TG analysis were used to determine the nature of water molecules present and decomposition pattern of the complexes. Lattice water molecules were lost in the 70-110 °C temperature range while coordinate water molecules were eliminated at relatively high temperature range of 150-240 °C. complete decomposition of ligand occur at about 800 °C and observed residue corresponds to respective metal oxide.

Present losses of material as obtained from TGA curve are good agreement with calculated percent loss in mass. Thermo gravimetric

results coincide well with DTA peaks. TGA/DTA scans are depicted in fig.

TGA/DTA of $[\text{Ni}(\text{MAPBEBTH})_2] \text{Cl}_2 \cdot \text{H}_2\text{O}$ shows five peak of decomposition. The first peak is observed at the temperature range 50-130°C and 9.023% loss of mass is observed. This loss of mass is due to the elimination of lattice chloride and water molecule from the compound. In second peak 18.047% loss is observed in the temperature range 130-280°C. The loss of mass is due to the elimination of two molecule of $\text{N}(\text{CH}_3)$ and ethoxy group form the complex. Third peak is observed in the temperature range 280-430°C and 15.411% mass is lost. This loss in mass is due to the elimination of two benzene ring from the molecule. In the fourth peak 31.228% mass is lost in the temperature range 430-570°C. The loss of mass is due to the elimination of two bromobenzene rings from the complex. Last peak is observed in the temperature range 570-760°C. In this peak 20.277% mass is lost. This loss in weight is due to the elimination of thiazole ring part and its substituent chain $\text{NH}-\text{N}=\text{CH}$. From the temperature 760°C curve of graph show constant value. It indicate that remaining mass is of metal oxide. Calculated value are coincide with observed value.

TGA/DTA $[\text{Cu}(\text{MAPBEBTH})\text{Cl} \cdot \text{H}_2\text{O}] \text{Cl}$ complex



TGA/DTA plot of $[\text{Cu}(\text{MAPBEBTH})\text{Cl} \cdot \text{H}_2\text{O}] \text{Cl}$ complex Shows five peaks of decomposition. First peak is observed at temperature range 50-110°C and 6.208% mass is lost. This loss in mass is due to the elimination of lattice chloride from the

complex. In second peak 9.356% mass is lost in the temperature range 110-260°C. This loss in weight is due to the burning of coordinate chloride and water molecule. Observed values are in good agreement with calculated values. Third peak is observed at the temperature range

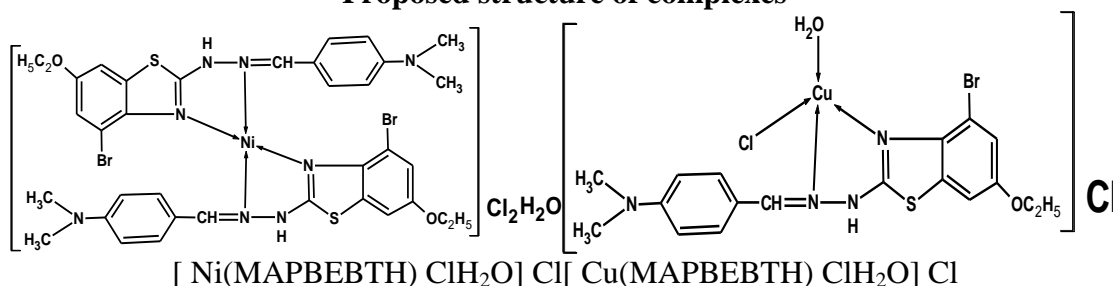
260-490°C . In this temperature range 15.564% weight is lost from the complex compound . this loss of mass is due to the elimination of $N(CH_3)_2$ and OC_2H_5 group from complex. Fourth peak is observed at temperature range 490-620°C and 40.622% weight is lost. This loss in weight is due to the elimination of bromobenzene ring. In last fifth peak 17.488% mass is lost in the temperature range 620-770°C this loss in mass is due to the elimination of thiazole ring part and its substituent chain $NH-N=CH$. From the temperature range 770°C curve of the graph show constant value of weight of complex it indicate that remaining mass is of metal oxide. Observed figures and calculated figures are approximately equal.

Thermal decomposition value of

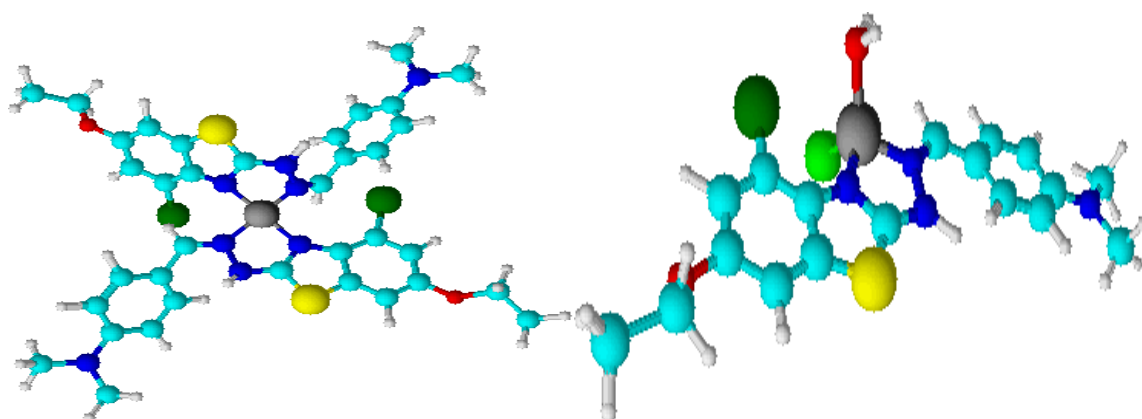
$[Ni(MAPBEBTH)_2] Cl_2 H_2O$ metal complex
 $[Cu(HMPBMBTH)H_2O]Cl$ metal complex

| Temp. range °C | % loss | Nature of decomposition |
|----------------|-----------------|---|
| 50-130 | 9.023 (9.087) | Lattice chloride & water molecule |
| 130-280 | 18.047 (18.022) | $N(CH_3)_2$ & OC_2H_5 |
| 280-430 | 15.411 (15.241) | Two benzene ring |
| 430-570 | 31.228 (31.385) | Two bromo Benzene ring |
| 5570-760 | 20.277 (20.262) | Thiazole ring part and substituted chain. |
| Temp. range °C | % loss | Nature of decomposition |
| 50-110 | 6.208 (6.069) | Lattice chloride |
| 110-260 | 9.356 (6.325) | Coordinated chloride & water molecule |
| 2260-490 | 15.564 (15.495) | $N(CH_3)_2$ & OC_2H_5 |
| 490-620 | 40.223 (40.269) | Two Benzen ring & Br. |
| 620-770 | 17.488 (17.40) | Thiazole ring and substituted chain. |

Proposed structure of complexes



Proposed 3D structure metal complexes



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Research Article



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Impact of fortification of mulberry leaves with homeopathic drugs on economic traits of silkworm *Bombyx mori* L.

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Abstract

In the present study the fifth instar Silkworm larvae, *Bombyx mori* L. were fed on the mulberry leaves fortified with homeopathic drugs Chemidonium, Nux vomica and Phytolacca berry mother tincture. The impact of treatment on larval, cocoon, shell and pupal weight, silk ratio, larval mortality, average filament length, filament weight and denier were investigated. The results showed that, there was positive impact on most of the characteristics of silkworm *Bombyx mori* L. larvae fed on mulberry leaves fortified with homeopathic drug Chilidonium and Nux vomica, while with Phytolacca berry shows negative impact on most of the economic characters of *Bombyx mori* L.

Keywords: *Bombyx mori*, Mulberry leaves, Fortification, Homeopathic drug, Chilidonium, Nux vomica, etc.

Introduction

The nutrition background of the larvae influences greatly on the resulting pupa, adults and silk production. The leaves of superior quality enhance the chances of good cocoon crop. The dietary nutritional management influences directly on quality and quantity of silk production in *Bombyx mori* L., Muragan, et al., (1998). In recent years, many attempts have been made either to fortify the leaves with nutrients, spraying with antibiotics, juvenile hormone, plant products with JH mimic principles or using extracts of plants etc. to improve the quantity and quality of silk. The fortification or supplementation of nutrients along with natural diet, enrich the nutritional value of the diet, making it more useful from the nutritional point of view, Hippargi, (2001), Sannapa B., et al. (2002). K. Masthan et al. (2017).

It is seen that, there are no attempts made by using the Homeopathic drugs for improving the status of sericulture industry. In this light for the benefit of

common farmers, this is the attempts has been made to find out the effect of Nux vomica, Chelidonium and Phytolacca berry, homeopathic drugs on the biological parameters of silkworm *Bombyx mori* L. The drug picture is explained nicely by Tyler, (2002). The importance of homeopathic drugs and their effective sustainable use other than human is explained well by Naveen, (2005) and impact of homeopathic drugs on the silkworm characters were positive on most of the characters was explained by Hiware, (2005), Hiware, 2006).

Materials and Methods

Experimental details

- i) Design : Completely Randomized Design (CRD)
- ii) No. of replication : 3
- iii) Mulberry variety : V1
- iv) Number of treatments : 3

T1= Chelidonium
 T2= Nux vomica
 T3= Phytolacca berry

The productive bi x bivoltine hybrid CSR2 x CSR4 was used for evolution of effect of above drugs on biological characters of silkworm.

The experiment was conducted by taking randomly just 4th moult passed i.e. 5th instar larvae in four groups. For each group i.e. one control and three experiments 50 larvae were taken in three replicates. All the groups were exposing to the trial under same environmental condition.

For fortification the mother tincture of Chelidonium, Nux vomica and Phytolacca berry were procured from local Central Homeopathic Pharmacy Shop, Dalalwadi, Aurangabad, M.S. India. The test solutions were prepared by using 10 ml of drug with 40 ml of distilled water was used as stock solution, kept in refrigerator. The quantity of feed given to the all groups with 40 g of matured mulberry chopped leaves for each feed and 4 feedings per day were provided. One group was kept control giving the first feeding by using non treated only distilled water but the experimental group was given first feed sprinkled, mixed with the 2 ml of test solution till the larvae went

on spinning. Evaluation was on the basis of larval weight, total mortality, cocoon weight, shell weight, pupal weight, shell ratio, filament weight, filament length and denier. The valves were compared between experimental and control groups in terms of percent change over control.

Results

There was a trend favoring in two treatments with Chelidonium and Nux vomica in more characters observed except cocoon weight, pupal weight and denier of filament in experimental group compared to the control group. The treatment with drug Phytolacca berry showed negative trend in most character except shell ratio percent. The result showed that larval weight was significantly increased in the groups treated with drug Chelidonium (3.387g) and Nux vomica (3.524g), when compared with control group (3.112g) by the values 8.119% and 11.691% respectively. But in the group treated with drug Phytolacca berry larval weight (2.962g) was significantly decreased with values -5.064%. Mortality in control group was 4 in number which similar to Chelidonium and Nux vomica groups, but in group treated with Phytolacca berry mortality was 5 in number. No significant difference between control and experimental groups.

Table-1: Effect of Chelidonium, Nux vomica and Phytolacca berry drugs on biological characters of silkworm.

| Sr. No | Characters | Control group | Treatment group | | | Percentage change over control (%) | | |
|--------|---------------------|---------------|-----------------|----------|--------|------------------------------------|--------|--------|
| | | | T1 | T2 | T3 | T1 | T2 | T3 |
| 1 | Larval weight (g) | 3.112 | .387** | 3.524** | .962** | 8.119 | 11.691 | -5.064 |
| 2 | Total mortality | 03 | 03 | 03 | 04 | 00.00 | 00.00 | 25.00 |
| 3 | Cocoon weight (g) | 1.804 | 1.800 | 1.795 | 1.772 | -0.222 | -0.501 | -1.805 |
| 4 | Shell weight | 3.60 | 0.387* | 0.392* | 0.357 | 6.976 | 8.163 | -0.840 |
| 5 | Pupal weight(g) | 1.444 | 1.413 | 1.403 | 1.415 | -2.193 | -2.922 | -2.049 |
| 6 | Shell ratio (%) | 19.955 | 21.50** | 21.838** | 20.146 | 7.186 | 8.622 | 0.948 |
| 7 | Filament length (m) | 887 | 998* | 1008** | 871 | 11.122 | 12.003 | -1.836 |
| 8 | Filament weight(g) | 0.234 | 0.268* | 0.284* | 0.230 | 12.686 | 17.605 | -1.739 |
| 9 | Denier | 2.374 | 2.416 | 2.535 | 2.376 | 1.738 | 6.351 | 0.084 |

* < 0.05; **<0.01; t- test

There was significantly an increased or positive trend shown in the values of different characters viz. shell weight (0.387g), shell ratio percentage (21.50 %), filament length (998m) and filament weight (0.268g) in the group treated with drug Chelidonium over control group by values 6.976%, 7.186%, 11.122% and 12.686% respectively. More or less similar trend was observed in the group treated with drug Nux vomica regarding characters, shell weight (0.392g), shell ratio percentage (21.828 %), filament length (1008 m) and filament weight (0.284g) over the control group by values 8.163%, 8.622%, 12.003% and 17.605% respectively. Cocoon weight (1.800g), pupal weight (1.413g) and filament denier (2.416) were decreased in the group treated with drug Chelidonium when compared with control group. Similar result was also observed in the group treated with Nux vomica regarding characters cocoon weight (1.795g), pupal weight (1.403g) and filament denier (2.535) when compared to control group with values - 0.501%, -2922% and 6.351% respectively. In the group treatment with drug Phytolacca berry showed negative trend for all characters under studied except shell ratio percentage (20.146 %) compared with control group but it was non-significant over control group.

Discussion

The results revealed that, in the group treated with drug Chelidonium significantly increased larval weight (3.387g), shell weight (0.387g), shell ratio percentage (21.50%), filament length (998m) and filament weight (0.268g) over control group except cocoon weight (1.800g), pupal weight (1.413g) and denier of filament (2.416). It was not significant to control group. The similar trend was occurred in the group treated with Nux vomica for all characters; larval weight (3.524g), shell weight (0.392g), shell ratio percentage (21.838 %), filament length (1008 m) and filament weight (0.284g) over control group. The finding of increased larval weight was in line with the finding of Verma, et al., (1963); Rajshekhargouda, et al., (1999); Ray, et al., (2002); Cui, et al., (2003) and Kamalakannani, et al., (2005), Hiware, (2005, 2006), Avhad et al. (2015). The result of increased in shell weight, shell percentage and filament length are in line with Rai, et al., (2000); Sundar, et al., (2003) and partially in line with result of Rajendra Prasad, (2004) but they have used other methods feeding supplementation. The present study of increased most of the characters by fortified leaves with homeopathic drugs Chelidonium and Nux vomica is co-related with Hiware, (2005, 2006).

Filament size increased by 12.686% and length by 11.122% in group treated with Chelidonium and in Nux vomica these were increased by 17.605% and 12.003% respectively. This result is similar to the finding of Kalpana, et al., (2002); Rahmathulla, et al., (2003) by other supplementation methods. In group treated with drug Phytolacca berry showed negative trends of all character except shell ratio percentage (20.146%) over control group by value 0.948, it was not significant.

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AN OPTIMIZATION MODEL HARVESTING SUGARCANE IN MAHARASHTRA

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ABSTRACT

This paper addresses the management of a sugarcane harvest over a multi-year planning period. Sugar Industry in Maharashtra is one of the most notable and large-scale sugar manufacturing sectors in the country. The pace of growth of sugar manufacturing has been massive over the past few years. The sugarcane harvest is the complex logistical operation that involves the cutting and loading of cane in the fields, the transportation to the factories and the unloading of the cane in order to meet a daily quota.

INTRODUCTION

Sugar industry is totally dependent on sugarcane production. Sugarcane cultivation is one of the significant occupations of Indian farmers. Maharashtra is one of the important centre of sugarcane production and sugar also. Major sugar industries in Maharashtra are located at various places, but western Maharashtra is a major area of sugarcane and sugar industry. Sugar industry in Maharashtra has developed under co-operative movement. Almost all sugar industries in Maharashtra are in the co-operative sector.

The Maharashtra Sugar Industry has seen a spectacular growth owing to the different conducive in the state. One of the chief crops in Maharashtra is sugarcane, with a host of sugar industries been set up over the years. This work focuses on support for crucial decisions that must constantly be made in sugar cane cultivation and harvest. It aims to give suggestions to such decisions in order to support the planning in sugar cane industry. In India sugar is controlled commodity under essential commodity act 1955. Government of India imitated de-licensing policy in sugar industry in 1998. In view of globalization process and since then industry has experienced significant changes. Central Government announced Statutory Minimum Prices (SMP) of sugarcane and on this basis state Governments fix State Advised Prices (SAP). Unfortunately, SAP is being used as a political tool and has been main concern of sugar mills as it results in escalation of production costs. Along with this sugar industries also faces another problems like Roll of co-operative sector, Competition from Gur production, problems of production of sugar, the problems of by-products, problems of faulty Government policy, the questions of minimum economic size, old machinery, competition from cheaper imports, Low sugar Recovery, Cane Price, Levy sugar obligations, Imports / Exports Policy etc. In this paper, the main concern is to review the literature on Mathematical Programming used in sugar

industry. A Mathematical Model is to be developed for Harvest Scheduling, Transportation of sugarcane to mill so as to Maximize Recovery of sugar from sugarcane.

GROWTH OF SUGARCANE CULTIVATION

Sugarcane is cultivated in India in general and Maharashtra in particular as one of the major cash crops. Sugarcane requires ample water. Therefore, the same is cultivated only when sufficient irrigation facility is available. Sugarcane cannot be developed in rainfed land. Neither it can be cultivated with meager water facility. Similarly the soil must also be black, alluvial soil. Further it requires sufficient dose of fertilizers. In brief sugarcane cultivation depends upon a number of factors. The researcher has studied sugarcane cultivation in India with reference to Maharashtra with reference to some significant aspects.

MATHEMATICAL MODELLING IN SUGARCANE CULTIVATION

Individual farmers must repeatedly make decisions about what commodities to produce, by what method, in which seasonal time periods, and in what quantities. Decisions are made subject to the prevailing farm physical and financial constraints, and often in the face of considerable uncertainty about the planning period ahead. Uncertainty may arise in forecasted yields, costs, and prices for the individual farm enterprises, in enterprise requirements for fixed resources, and in the total supplies of the fixed resources available.

OPTIMISATION PROBLEM

The problem of optimization of some quantity subject to certain restrictions or constraints may be a common feature of economics, industry, defense, etc. the standard method of maximizing or minimising a function involves constraints within the sort of equations. Thus utility may be maximized subject to the budget constraint of fixed income, given in the form of an equation. But if the constraints are inequalities rather than equations and that we have an objective function to be optimized subject to those inequalities, we use the tactic of mathematical programming.

If the constraints are in the form of equations, methods of calculus can be useful. But if the constraints are inequalities instead of equations and we have an objective function to be optimized subject to these inequalities, we use the method of mathematical programming.

Mathematical Model

In this section, a mathematical model is developed to optimize the sugarcane harvesting plan in an area containing different varieties with different maturation periods. An agricultural area consists of F farms where each farm is divided into several plots. In total there are k plots, and each plot is planted with one sugarcane variety. There are n different possible sugarcane varieties to select from each plot. It is assumed that the variety planted for each plot (m) is known, and the date (X_{0_m}) when this variety was planted is also fixed $m = 1, \dots, k$.

The problem is to determine the harvesting plan of this sugarcane during the planning horizon in order to satisfy all demand (D_i) in established months (T_i) and to harvest the sugarcane for each month (X_m) in the PIU, ($X_m = X_{0_m} + X^* + dm$). The preferred harvest time is in the period as close as possible to the maximum maturation period ($X_{0_m} + X^*$) of the sugarcane. The polt constraints demand imposed by the mill, $i = 1, \dots, n$; $m = 1, \dots, k$, should also be considered. The first one aims to minimize the sum of deviations from the optimal maturation in all lots to be harvested. Due to the high cost of machinery, we also want to minimize the number of farms being harvested in the same period. However, these objectives are conflicting, i.e., the optimization of one leads a worsening of the other, and vice-versa, because if we try the minimize the deviations from the optimal maturity, then the model chooses to harvest several farms in the same period. On the other hand, if the machinery is limited to a lower number of farms in the same period, then the tendency of generating delays.

The algebraic formulations of the model can also be illustrated with the Zee Farm example. Suppose that X_1 = corn, X_2 = beans, X_3 = sorghum, and X_4 = sugarcane, then the algebraic version of the model becomes :

$$\text{Max } Z = 1372 X_1 + 1219 X_2 + 1523 X_3 + 4874 X_4$$

Such that,

$$1.0 X_1 + 1.0 X_2 + 1.0 X_3 + 1.0 X_4 \leq 5.0$$

$$1.42 X_1 + 1.87 X_2 + 1.92 X_3 + 2.64 X_4 \leq 16.5$$

$$1.45 X_1 + 1.27 X_2 + 1.16 X_3 + 1.45 X_4 \leq 10.0$$

$$0.983 X_4 \leq 0.5$$

and

$$X_1, X_2, X_3, X_4 \geq 0$$

CONCLUSION

The sugarcane contributes significantly to the economies of many countries. However, there are still great challenges for sugarcane culture such as increase sugarcane productivity. This paper proposes a sugarcane harvest scheduling model and solution algorithm that allows mill owners to effectively and efficiently manage their harvesting operations over a multi-year planning horizon.

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Mathematical Analysis for Sugarcane Industry in Maharashtra

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Abstract

The sugar industry in Maharashtra is one of the most significant and large scale sugar producing areas in the country. The sugarcane industry is the foundation of the sugar industry. It is a source of raw material for the sugar industry. In this paper we have discussed that mathematical models can be applied in both areas, however the researcher has chosen to focus on the sugarcane industry. i.e. agricultural sugarcane production.

Keywords: Sugarcane industry, Economic equilibrium, mathematical model, input-output analysis

INTRODUCTON:-

The sugar industry in Maharashtra is one of the most significant and large scale sugar producing areas in the country. The pace of growth in sugar production has been tremendous in the last few years. The latest sugar production figures in Maharashtra show that the country is doing better than other states. The sugarcane industry, which is the backbone of co-operative work in Maharashtra, can be strengthened if the mathematical programming techniques are properly adopted. It is necessary to differentiate between the sugar industry and the sugarcane industry. The sugar industry is the sugarcane and the sugar production in the sugarcane industry is the cultivation of sugarcane and the growth of sugarcane. The sugarcane industry is the foundation of the sugar industry. It is a source of raw material for the sugar industry. Mathematical models can be applied in both fields; however the researcher has chosen to focus on the sugarcane industry i.e. the production of sugarcane in the field. In this paper an attempt is made to apply input-output analysis to sugarcane cultivation and sugar industry.

REVIW OF LITRETURE

Singh S. P., Parashar Anil K. & Singh H. P. (1977), in their research entitled, “Econometrics and Mathematical Economics”, have focused on Econometrics and Mathematical Economics. According to the authors, “Economics is a method now widely used in economic research. Today its study covers widespread fields of economic life and embrace a variety of economic problems. These methods consist of the application of modern statistical procedures to theoretical models formulated in mathematical terms. Econometric methods are of paramount importance to the verification of economic laws and are also potentially useful for the formulation of new economic laws and governmental policies.”

Thomas L. Saaty (1959), in his valued work entitled, “Mathematical Methods of Operations Research”, has discussed at length with reference to use of mathematical methods in operational research. The main purpose of this work is to present some mathematical methods essential to operation research. This study on the historical background of operations research sets forth general ideas on the subject, to provide perspective. The remaining eleven chapters pursue the task of examining specific ideas and illustrating specific methods. The mathematics of this work is divided essentially into two parts – one on methods of optimization and another on the theory of probability and on statistical methods. The last chapter, which is an essay, challenges the reader to approach problems creatively and includes a collection of elementary problems as illustrations.

MATHEMATICAL AND NON MATHEMATICAL ECONOMICS:-

Since the economics of mathematics is only an approach to economic analysis, it should in no way differ, nor should it, be different from the nonmetal approach to economic analysis. The aim of any theoretical analysis is always to derive a conclusion or theorem from a set of theorems or theorems through the process of reasoning, regardless of point of view. The main difference between "mathematical economics" and so-called "literary economics" is mainly explained in mathematical symbols and equations rather than in words; In addition, instead of literary logic, mathematical theorems are used - in the process of reasoning, there must be multiplicity. Symbols and words are indeed the same (testifying that symbols are usually defined in words)

The problem of input output analysis is primarily technical. The amount of medium products used in the cane and sugar production process and the available resources are related to the state of technology to a certain extent.

INPUT – OUTPUT ANALYSIS

Input output analysis is a technique for analyzing inter industry relations here sugarcane cultivation and sugar production. It is an analysis of the interdependence of the economy as a whole and studies the pattern of movements of intermediate products from one industry to other industries and the consumers. Input output analysis, thus,

considers general economic equilibrium empirically, by a study of the interdependence of the production plans of industries in the economy. An input output table shows, at a point or over an interval of time, the structural characteristics of an economic system in the form of statistical data and a method of analyzing and understanding the system.

Input output is a name given to the attempt to take account of general equilibrium phenomena in the empirical analysis of production. Demand theory plays no role in the hard core of input-output analysis. The problem is essentially technological. The investigation seeks to determine what can be produced, and the quantity of each intermediate product which must be used up in the production process, given the quantities of available resources and the state of technology.

Input-output analysis is an empirical investigation. This is primarily what distinguishes it from the work of Walras and later general equilibrium theorists. A consequence of this no doubt long-overdue concern with the facts is that compromises have been forced on the investigator. Input-output employs a model which is more severely simplified and also more narrow in the sense that it seeks to encompass fewer phenomena than does the usual general equilibrium theory. Its narrowness lies in its exclusive emphasis of the production side of the economy. Its oversimplifications I shall discuss presently.

Input-output seeks to take account of the interdependence of the production plans and activities of the many industries which constitute an economy. This interdependence arises out of the fact that each industry employs the outputs of other industries as its raw materials. Its output, in turn, is often used by other producers as a productive factor, sometimes by those very industries from which it obtained its ingredients. Steel is used to make railroad cars and railroad cars are, in turn, used to transport steel and the coal and pig iron which are used in its manufacture.

ASSUMPTIONS OF INPUT OUTPUT ANALYSIS:

A number of simplifying assumptions have to be made in analysis. Each industry produces a single, homogeneous product sugarcane/ sugar. To relax this assumption to some extent the single product may be considered as a composite product made of several items used in it in fixed proportions. There is only one primary input, i.e., labour. Final demand is from consumers only.

In any productive process all inputs are used in fixed proportions and increase in input is in proportion with the level of output. Production takes place through processes with constant technical coefficients. In other words, input output relations are assumed to be linear relations of direct proportionality. Production in each industry is subject to constant returns to scale. The sugarcane producing sector consists purely of competitive firms.

The output of any industry sugarcane becomes either the input of another industry sugar or the final demand or, it is added to the inventory of the industry. If, for any firm, total input equals total output, it is in equilibrium. If input exceeds output, inventories pile up, creating problems. Alternatively, if output exceeds input, inventories are exhausted. An industry may use some of its own product. Such use may be considered as a sale to

the industry itself.

The input output relations are technical in nature and not conditions of market equilibrium. The analysis is static, though easily extended to comparative statics e.g. by varying final demand.

All transactions may be considered in terms of money values since money is a suitable common unit for aggregating inputs and outputs of industries. Quantities and prices can also be considered for transactions.

In order that the total demand for the product of any industry be just sufficient we should know the level of output of each industry under consideration. Since the industries are interdependent the output levels must be consistent with the input requirements in the economy. This is to avoid difficulties in analysis.

| Output Input | Interindustry Sector | | Final demand sector | Total output (sales) |
|------------------------------|----------------------|-------------|------------------------|----------------------------|
| | Agr. | Ind. | Consumers | |
| Sugarcane | 300 | 600 | 100 | 1000 |
| Sugar | 400 | 1200 | 400 | 2000 |
| Consumers (Primary input) | 300 | 200 | 0 | 500 |
| Total input (cost) | 1000 | 2000 | 500 | 3500 |

Row 1 Column 1: 300 is the amount produced as well as consumed by the sugarcane cultivation agricultural sector.

Row 1, Col. 2: 600 is the amount sold by agriculture sugarcane to industrial sector sugar industry.

Row 1, Col. 3: 100 is the amount sold by agriculture sugarcane to household sector consumer.

Row 2, Col. 1: 400 is the amount sold by industry sugar to agriculture and so on.

Row 3, Column 3: The consumer or household sector sells nothing to itself. However, it produces "labour" and services: 300 (Row 3, Column 1) and 200 (Row 3, Column 2). The total of these two $300 + 200 = 500$ (Row 3, Column 4) is, therefore, the sum of wages and salaries received by the consumers or household sector.

It can be seen that a transactions matrix is useful in the study of the structure of the producing sector. It shows the way in which the productive activity is distributed throughout the economy. The method applied to the economic system can help in

predicting the response to any changes made in the system.

CONCLUSION:

Input output analysis is a technique for analyzing inter industry relations here sugarcane cultivation and sugar production. It is an analysis of the interdependence of the economy as a whole and studies the pattern of movements of intermediate products from one industry to other industries and the consumers. Mathematical programming is however, not a branch of economic theory but a separate discipline by itself having its own selection of economic principles and methods. In essence, mathematical programming rests on the edifice of programming.

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Role of Mathematical Programming to Rural Economy Development

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ABSTRACT: Maharashtra is one of the important center of sugarcane production and sugar also. Major sugar industries in Maharashtra are located at various places, but western Maharashtra is a major area of sugarcane and sugar industry. Sugar industry in Maharashtra has developed under co-operative movement. Rural Development is an improvement in the economic and social well-being of a specific group of people i.e. the rural poor and agriculture. Any rational scheme of economic development aiming at improving the living standards of people, agriculture development should be the starting point. The concept of Rural Development and mathematical modeling has become a very popular term among planners and policy makers.

KEYWORDS: Economy, sugar industry, Mathematical programming, Agriculture.

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I. INTRODUCTION

Sugar Industry in India is well maintained and is growing at a steady pace, boasting of a consumer base of over billions of people. India is the second largest producer of sugar over the globe. The Maharashtra sugar industry has been contributing nearly 40% of India's full sugar production. But the state is hopeful of translation a aid hand to those who need special guidance on it. With innovatory technologies being fulfill in the Maharashtra compliment trade, the potential can be fully clear. The Maharashtra Sugar Industry has accomplished a showy growth owing to the different conducive in the height. The Sugar industry in Maharashtra is very popular in the coactive sector, as farmers own a portion in the compliment factories. One of the chief crops in Maharashtra is sugarcane, with a landlord of sugar industries been set up over the years. Till now, the universal of futures trading has not been made clear to the rural mass of the Maharashtra compliment trade. The cooperative sugar-coat labor in Maharashtra has skilled the growth its heights with tomorrow venal being instrument in sugar manufacturing.

Objectives:

The objectives of the Study:

- (1) To study the capital of Sugar cane cultivation, harvest and logistic to factories of the agriculturists
- (2) To study the capital of the agriculturists' pattern for sugar cane cultivation
- (3) To study the obstacles, problems and the solving guideline of agriculturists for Sugar cane cultivation, harvest and logistic.

SOURCE OF DATA:

The study is mainly based on primary as well as secondary data through observations, survey, various journals, magazines, Books and Newspaper etc.

II. SIGNIFICANCE OF THE STUDY

Mathematical Programming is the application of scientific methods techniques and tools to problems involving the operations of systems, so as to provide those in control of operations with optimum solutions to the problems.

THE CONCEPT OF MATHEMATICAL PROGRAMMING

Mathematical Programming is the of modern science on complex problems arising in the direction and management of large systems of men, machines, materials and money in industry, business, government and defence. The distinctive approach is to develop the scientific model of system incorporating measurement of factors such as chance and risk, with which to predict and compare the outcomes of alternative decisions, strategies or controls. The purpose is to help management determine its policies and actions scientifically. The important characters of Mathematical Programming are –Mathematical Programming has a team approach. Mathematical Programming is carried out by team of scientists drawn from different scientific and engineering

disciplines. Mathematical Programming follows scientific approach to solve the problems. it uses scientific methods, techniques and tools to analyze execute type of problem. Mathematical Programming attempts to find optimal solution to problems. Mathematical Programming depends largely on mathematical models.

2. THE NATURE OF MATHEMATICAL ECONOMICS

Mathematical economics is not a distinct branch of economics in the sense if that public finance or international trade is. Rather, it is an approach to economic analysis, in which the economist makes use of mathematical symbols in the statement of his problem and also draws upon known mathematical theorems to aid in his reasoning. As far as the specific subject matter of analysis goes, it can be micro- or macroeconomic theory, or public finance, or the economics of underdeveloped countries, or what not. Using the term mathematical economics in the broadest possible sense, one may very well say that every elementary textbook of economics today exemplifies mathematical economics insofar as geometrical methods are frequently utilized to derive theoretical results.

The economic system may be thought of as a composite of mutually interrelated industries. In a comprehensive system, all industries have to be related to one another. In general, each industry buys its raw materials or inputs from other industries and sells some of its output to other industries in the system. There may be cases of some industries not buying from other industries and buying only from the primary producing sector. There may also be cases of industries selling their output not to other industries but only to the final consumption sector. But circular interdependence remains a common feature of the economic system. Such a comprehensive system cannot be managed, in a practical sense, by the usual methods.

Leontief's input output analysis gives the formulation of general economic equilibrium in terms of industries. The method is suitable for immediate empirical applications and is a simplified version of the production function equations of the general equilibrium system. The basic unit is the industrial sector and not the firm and a simple linear production function is used.

3.ROLE OF SUGAR FACTRIES IN AGRICULTURAL AND ECONOMIC TRASFORMATION

Sugar co-operative for their expansion gave importance to better sugarcane production, supply of appropriate agricultural inputs to farmers and increased irrigation facilities in their area of operation. In addition growth of educational facilities, medical facilities, etc. were also undertaken as a part of area development by these co-operatives to growth of ancillary units, like paper plants, distillery units etc. which in turn increased employment and led to further industrial development in the rural areas. The success of sugar co-operatives in their commitment to area development led to growth of other agro-based processing units like dairy co-operatives, spinning mills, fruit processing units and such agro based industrialization helped in the development of agriculture and brought about the necessary transformation of the rural areas and in the process the benefits of these activities reached the farmers and they too benefited and progressed. Such process of rural transformation and change is very noticeable in western Maharashtra and more so in Solapur district where the co-operative sugar factories have indeed become the 'Growth Centers' for rural development and change.

III. CONCLUSION

Mathematical programming pertains to the overlapping area of economics along with the tools of decision sciences such as mathematical programming, statistics and programming as applied to business programming problems. Various schemes have adopted by sugar factory for the surrounding rural area development in which Agriculture exhibition, Computer Training to employee etc.

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Underwater Image Classification using Machine Learning Technique with SIFT Algorithm

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Abstract— From decades, underwater exploration has increased tremendously. For data collections currently there are many instruments available (Sub bottom profiler and Remotely Operated Vehicle, Side Sonar Scan, Echo sounder with multi beam) in underwater observation and research not only provide the data about the sea surface but also provide data on objects and species. In this situation, selecting appropriate features is a very critical task. Because of less numbers of datasets in Underwater, it is so critical to distinguish the features/objects from the underwater images. To overcome this problem, Bag of Features model which is based on Machine Learning is used in this paper. From Shallow water the dataset is obtained using ROV. Making the classification of features is a quite difficult task because underwater optical images have a low light intensity; To obtain the maximum accuracy Speed Robust Features and algorithms in C are used.

Index Terms Speeded-Up Robust Features, Speeded-Up Robust Features, Image Classification, Underwater.

I. INTRODUCTION

Underwater images, due to various physical phenomena such as backward and forward scattering and light absorption the quality of image is compromised. Underwater exploration has increased exponentially. Currently available instruments for data collections (Side Scan Sonar, Multi Beam echo sounder, sub bottom profiler and Remotely Operated Vehicle) in underwater research and observation not only provide the data on objects and species, but also provide data about the sea surface. Image classification is a complicated process which is influenced by multiples factors. Normally there are two steps for classification of images the first one is identification and extraction of features which is followed by image classification based on features obtained. For the most probable solutions, identification methods are used which are image based. To accomplish this will use Machine Learning. Especially, supervised learning has established itself as a prominent class label distributor with predictor features. But

for underwater images, due to various physical phenomena such as backward and forward scattering and light absorption the quality of image is compromised. There are various other factors that make underwater image classification a daunting task. First, the water depth is the directly proportional to the uncertainty of the object i.e as the depth increases the object's uncertainty also increases. This uncertainty arises due to the fact that many aquatic species have the feature of themselves with the underwater environment which in turn results in certain changes in the image's background. Thus it becomes a challenging task to find a good combination of feature extractor and a classifier for a dataset where depth information is missing. Second, the costs of underwater equipment also play a major role. Third, it's a difficult task to recognize and select good features from the dataset. Nonetheless, it's a necessary precondition for object classification. And it also has numerous advantages such as minimization of computational cost and increase in accuracy. Feature Extraction is the process of segregating features from an image. It is vital to choose the features that prove to be valuable for classification task. The chosen features must be informative, non-redundant, and must facilitate further learning steps. Therefore the bag-of-features technique is selected for feature extraction as it is based on ordering of few local and global features.

Underwater exploration has increased exponentially. Currently available instruments for data collections (Side Scan Sonar, Multi Beam echo sounder, sub bottom profiler and Remotely Operated Vehicle) in underwater research and observation not only provide the data on objects and species, but also provide data about the sea surface. In this regard, selecting suitable features is a huge task. Due to limited datasets in Underwater, it is difficult to classify the objects/features from underwater images. In order to overcome this, machine learning based Bag of Features model is adopted in this paper. The dataset is obtained from shallow water using ROV. Since the underwater optical images have low light intensity, making the classification of features a difficult task; SURF (Speeded-Up Robust Features) and SVM (Support Vector Machines).

II. Literature Survey

Optical and sonar based systems are the two main imaging modalities used for underwater vision-based navigation [1, 2, 3]. In underwater imaging systems, recognition of man-made objects plays an important role for conducting research in domains such as oceanographic species identification, pipeline overhauling, mine detection, and naval studies, among others [4, 5, 6]. Compared with sonar imaging, optical imaging, due to its ability to capture greater details and color, has found greater applicability in underwater object detection tasks [7]. With the development of underwater optical image sensors, manmade target recognition from underwater optical images has attracted greater attention in both oceanic engineering and image processing [4, 8, 9]. Poor image quality is one of the biggest challenges in underwater optical image analysis (Fig.1). Image quality is often low due to factors such as impurities in the water, and high water density [4]. Besides, limited visibility due to the exponential attenuation of light in deep waters also further degrades image quality [7]. Very few studies have been conducted in the domain of man-made target recognition from underwater optical images. In both [10] and [11], the authors built systems to identify and recognize underwater man-made objects using color information. Hou et al. [12] proposed a detection method from features based on the color and the shape of underwater manmade objects. In [13], the authors reported a system for detecting the presence of man-made objects from unconstrained subsea videos. They extracted object contours as stable features, and then employed a Bayesian classifier to predict the presence of a man-made object in the image. Therefore, it is natural to consider the use of deep learning to recognize man-made object from underwater optical images. However, there are certain challenges which must be addressed in order to effectively use deep learning techniques for this task. For deep learning, one of the prerequisites is the availability of large-scaled labeled data, needed for the estimation of parameters during the training phase. Also, similar to traditional machine learning methods, deep learning assumes that the training and the testing samples follow a similar distribution [15] - that is, the imaging procedures for capturing the training and the testing samples should be the same or similar. In real-world scenarios, for underwater imaging, it is challenging to collect and label sufficient underwater man-made objects.

III. Related Work

Image Pre-Processing

Underwater images are degraded by scattering and absorption of light in water. The whole idea of applying enhancement technique.

Feature Extraction

The proposed system uses SURF (Speeded Up Robust Features) feature extraction algorithm. It is a local extraction algorithm capable of detecting features such as blobs and corners, but not key points about regions. Using a pre-computed integral image with 3 integer operations, an integer approximation of the Hessian blob detector is used to locate points of interest in an object. Based on the sum of the Haar wavelet response, the feature descriptor is calculated and can be calculated using the integral image. Since the annotation accuracy depends heavily on the representation of the feature, the use of different region / point descriptors and/or the representation of the BoW

function.

Bag-of-Features

The bag of features is a new concept and is famous for its simplicity and performance. Here input image is divided into sample sets consisting of independent patches. Later visual descriptor vector is calculated for each patch. When creating the bag of features dataset, the SURF features are extracted from selected feature point locations.

IV. Proposed Approach

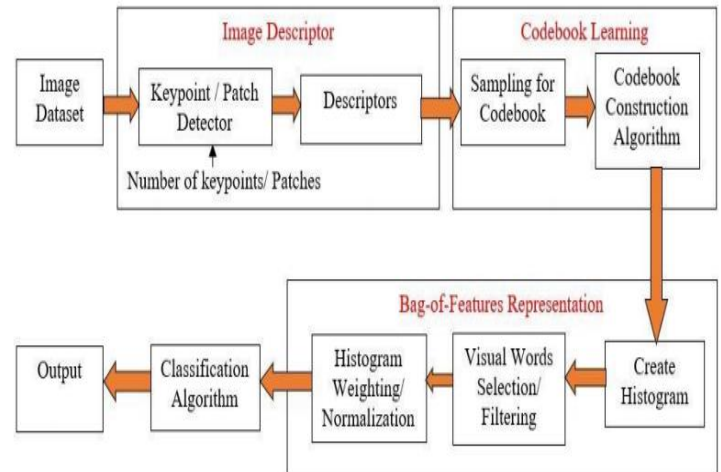


Fig. 1 Flow Diagram of Proposed System

Modules

- *Image Preprocessing*
- *Feature Extraction*
- *Codebook Learning*
- *Distance Calculation(Histogram Based)*
 - *Classification*

Methodology

Image Pre-Processing Underwater images are degraded by scattering and absorption of light in water. The whole idea of applying enhancement technique is to increase the dynamic range of the gray levels in the image being processed. This not only results in good computational analysis but also improves the performance of succeeding tasks, such as image analysis, object detection, and image segmentation. The Contrast Limited Adaptive Histogram Equalization (CLAHE) method is adopted for pre-processing. The flow diagram of the system is represented in Figure

Feature Learning First, through the K-means unsupervised learning process, the proposed system learns representative bases on unlabelled data for each model. Then the comparison between the labelled data and the representative bases is determined to derive the desired features from the labelled data. Such labelled features are fused to represent the identity and then fed to make the final identification to the classifiers. There are two main stages: object representation function and quality classification. Classification quality depends on the features extracted, classification.

Image Preprocessing:

Underwater images are degraded by scattering and absorption of light in water. Image enhancement is a pre-processing process which improves the quality and appearance of the image. The whole idea of applying enhancement technique is to increase the dynamic range of the gray levels in the image being processed.

Get the red, green, and blue values of a pixel

Use fancy math to turn those numbers into a single gray value

Replace the original red, green, and blue values with the new gray value

When describing grayscale algorithms, I'm going to focus on step 2 – using math to turn color values into a grayscale value. So, when you see a formula like this:

$$\text{Gray} = (\text{Red} + \text{Green} + \text{Blue}) / 3$$

CLAHE correction:

The Contrast Limited Adaptive Histogram Equalization (CLAHE) method is adopted for pre-processing since it is a popular method for local contrast enhancement and has been proved useful for several applications.

Feature Extraction:

It is a local extraction algorithm capable of detecting features such as blobs and corners, but not key points about regions. Using a pre-computed integral image with 3 integer operations, an integer approximation of the Hessian blob detector is used to locate points of interest in an object.

Codebook Learning:

A visual codebook is generated by using off-line k-means clustering. The word histogram is constructed by first linearly searching the codebook and finding the visual word closest to the selected feature. The codebook size is determined based on the number of feature clusters.

Distance Calculation(Histogram Based):

The word histogram is constructed by first linearly searching the codebook and finding the visual word closest to the selected feature.

Classification:

Classification of image is a huge task, and this is simplified using supervised machine learning algorithm SVM. The concept of SVM lies in the creation of hyperplane for classification. The hyperplane is nothing but a geometric line that with the help of which the classification problem is either identified as multiclass SVM or linear SVM.

SIFT Algorithm Feature Extraction:

SIFT keypoints of objects are first extracted from a set of reference images[2] and stored in a database. An object is recognized in a new image by individually comparing each

feature from the new image. From the full set of matches, subsets of keypoints that agree on the object and its location, scale, and orientation in the new image are identified to filter out good matches. The determination of consistent clusters is performed rapidly by using an efficient hash table implementation of the generalized Hough transform. Each subject to further detailed model verification and subsequently outliers are discarded. Finally the probability that a particular set of features indicates the presence of an object is compute. Object matches that pass all these tests can be identified as correct with high confidence.

Mathematical Model

S: is a System.

D: Set of Dataset.

IP: Image Preprocessing.

SM: Segmentation.

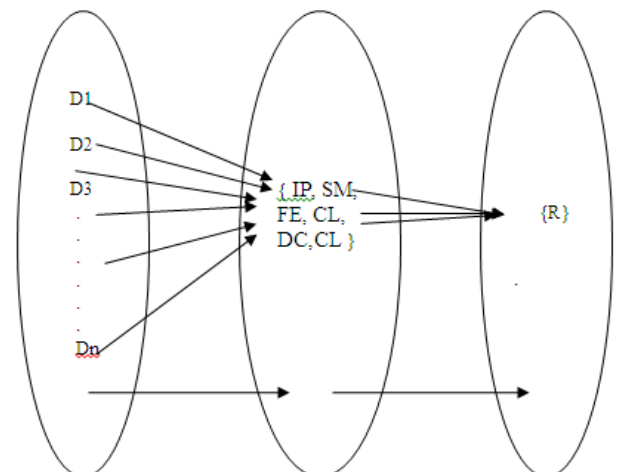
FE: Feature Extraction(SIFT)

CL: Codebook Learning.

DC: Distance Calculation (Histogram Based).

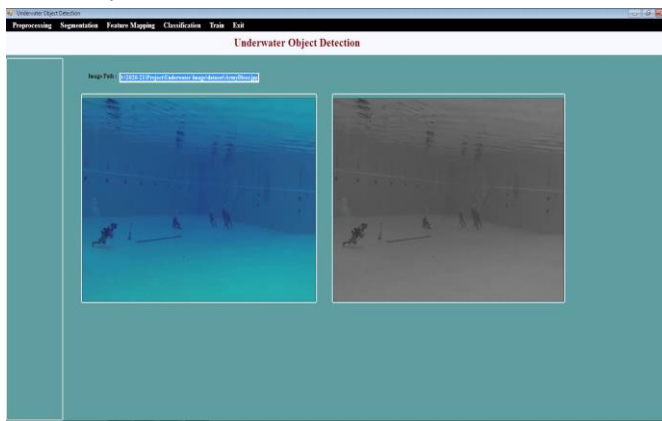
CL: Classification

$$Y = \{ IP, SM, FE, CL, DC, CL \}$$

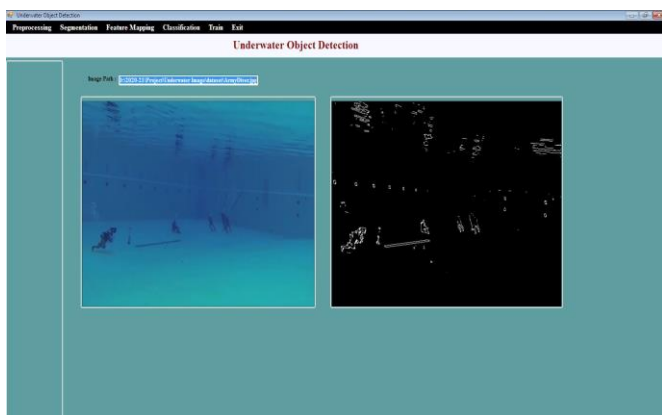


V. RESULTS

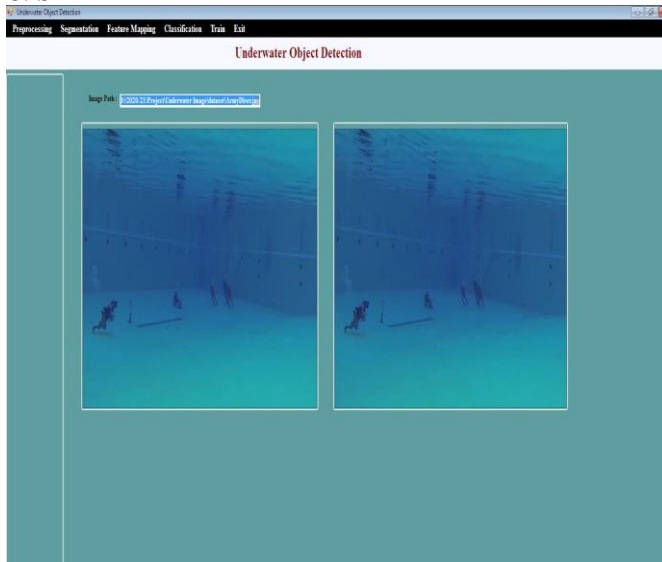
A. Grayscale



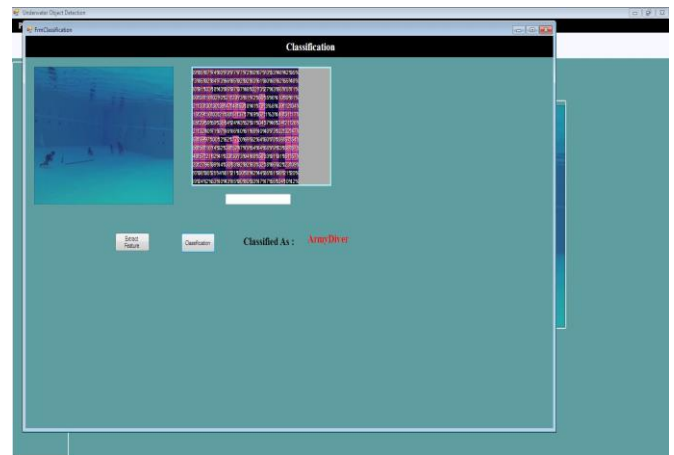
B. Canny Edge Algorithm



C. SIFT



D: Classification



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VI. CONCLUSION

Our Proposed to detect the object in the image. However, to directly acquire sufficient underwater images to train the network is difficult. Thus, we synthesized the training images by emulating the imaging mechanism of the learning technique.