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INDEX

No.	Title of the Paper	Author's Name	Page No.
01	Effect of Some Organic Solvent on Pollen Grain Germination, Pollen Viability and Pollen Tube Length of <i>Manilkara Zapota</i> (L.) Van Royen.	Bhagwan Jaiswal	08
02	Study of Fish Market for Waste Management	A. M. Rana, R. S. Saba	13
03	Callus Induction From Seed Explant of <i>Andrographis Paniculata</i> - A Valuable Medicinal Plant	Ansari Heena, Nirmalkar Vaishali*	15
04	Cyclone Nisarga: Damages and Loss in Biodiversity	Archana Gupte	19
05	Impact of Deforestation on Medicinal Plants in India	Asmita Raut	24
06	Sacred Groove in Dahanuluka, Palghar District, Maharashtra.	Prof. Dakshata Manish Patil	27
07	Study and Application of Activity of Vesicular Arbuscular Mycorrhizae (Vam) on Sugarcane Plant Roots <i>Saccharum of ficinarum</i> A/P Girzani (Akluj) Tal: Malshiras, Dist. Solapur, Maharashtra, India.	Dhainje P. M., Savalajkar R. L., Kumbhar R. C.	32
08	Dye Decolorization Using Laccase from <i>Pleurotus Sajor-Caju</i>	Deepawali Kale, Nisha Muni, Anil Avhad, Singh Dan Bahadur	38
09	Bamboo Plantation for Enhancing Ecosystem Services from Degraded Land	Dr Ritu Jain	47
10	To Study The Antibacterial Activities Of Different Parts Of <i>Solanum Xanthocarpum</i>	Dr. (Mrs.) Shilpa M. Gharat , Mrs. Ishwari N. Mehta	50
11	Agricultural Practices: An Approach towards Environmental Sustainability	Dr. Abhijit Sahasrabudhe	56
12	Environmental Concerns in Amitav Ghosh's 'The Hungry Tide'	Dr. Arundhati Barde	61
13	Allelopathic Effect of <i>Eucalyptus Globules</i> (Labill) Leaf Leachates on Germination and Growth of <i>Trigonella-Foenum Garecum</i> L.C.V. Lam Selection-I	Dr. Vikram. P. Masal	65
14	Diversity in Mangroves and Their Associates	Dr. Sonali Kadam	69
15	Ecotourism: An Farmhouse Assessment	Dr. Yogesh Kulkarni	77
16	Ethnobotanical Study of Jawhar Taluka, Palghar District, Maharashtra State, India.	Dushyant Dhangade , Onkar Kotiwar	80
17	GC-MS Analysis of <i>Calotropis Procera</i> L. and <i>Tribulus Terrestris</i> L.: A Medicinal Plants	Ghule, A. H., M. N. Jagtap	86
18	Green Habits of Clean Energy Technology: Policy Framework	Kalyani K Joshi, Nikhil S Dhage	90
19	Ecotourism-The Ecological Boon	Kavita Rambal	98
20	Efficacy of <i>Blumea Malcolmii</i> Leaf Extracts as A Safe Fungicide Against Phytopathogenic Fungi	Momin Naziya, Nirmalkar Vaishali	101
21	Comparative Study of Physico-Chemical Aspects of Ponds in Palghar Taluka, Palghar District, Maharashtra State, India	Mr. Harshal Chaudhari , Dr. Pankaj Gogari	106
22	Environmental Audit of Kokuyo Camlin Ltd, Mide Boisar, Maharashtra	Pratiksha Borse, Rudrakshi Raut	111
23	Investigation of Qualitative Phytochemical Analysis And antioxidant Activity of <i>Tamarindus Indica</i> L.	Prerana Jadhav, Sharad Dandekar, Sudhir Bale	116



24	Study of Aquatic and Semi Aquatic Plant Diversity of Kurze Dam in Talasari, Palghar Raut Sachin, Mali Kamlesh, Raut Asmita	122
25	Heavy Metals Analysis in Avicennia Marina (Forsk.) (Vierh.) Fromsaravali region, Palghar district, Maharashtra, India Rudrakshi Raut	126
26	Estimation of Phenols as Indicators to Stress from Pollution among Plants Sampled Along Mithi River, Mumbai Rushikesh S. More, Sakshi S. Chaubal	133
27	Weed Biomass – A Source of Energy Sangita Ghadge	140
28	Isolation and Screening of Amylolytic Fungi from Textile Sizing Site Shaikh Asfiya, Nirmalkar Vaishali	148
29	Emergence of Antibiotic Resistant Bacteria in Coastal Waters of India - A Looming Threat Shailaja.P.Palan, Sphurti Tare	153
30	Conservation Practice for the Sustainable Utilization of Plant Biodiversity in Saphale Ghat in Palghar Taluka From Palghar District, Maharashtra. Shivangi Chaudhari	163
31	Role of Ficus Benjamina L. Var. Nuda (Miq.) M. F. Barrett in Greenbelt Development in Mumbai Dr. Alkama G. Faqih and Dr. Nitesh C. Joshi	166

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- Chief & Executive Editor

RESEARCH JOURNEY



To Study The Antibacterial Activitys Of Different Parts Of *Solanum Xanthocarpum*

1. Dr. (Mrs.) Shilpa M. Gharat *

Asst. Professor, Head of the Department and PhD guide, Biotechnology, Sonopant Dandekar Arts, V.S. Apte Commerce and M. H Mehta Science College, Palghar 401404

2. Mrs. Ishwari N. Mehta

Asst. Professor, Department of Biotechnology, Sonopant Dandekar Arts, V.S. Apte Commerce and M. H Mehta Science College, Palghar 401404

Abstract:

Solanum xanthocarpum (com.name-Yellow-berried Nightshade, Kantakarj) is a wild plant used by the tribal people in Palghar district of Maharashtra. as a folk medicine. Different parts of the plants viz. Leaf, roots, fruits and stem are used to exhibit antibacterial and antifungal activity.

The present study aimed to determine the antibacterial activity of different parts of the *Solanum xanthocarpum* plant. The parts of the plants considered in the study were- Leaf, roots, fruits and stem. The acetonic and methanolic extracts of sun dried powdered form and fresh sample extracts of mentioned parts, following disc diffusion method were tested for their antibacterial activity against Gram positive and Gram negative pathogenic cultures of *Escherichia coli*, *Klebsiella pneumoniae*, *Salmonella typhi* and *Staphylococcus aureus*. Gentamicin was used as a standard antibiotic.

From the study conducted, it was observed that Methanol extract of dried root was found to be potent to inhibit *Escherichia coli*. Acetone and methanolic extracts of fresh leaf as well as methanolic extracts of fresh root were found effective against *Escherichia coli* and *Staphylococcus aureus*. It was also observed that *Staphylococcus aureus* was inhibited by the acetone extract of fresh root.

Keywords: Antibacterial, antifungal activity, *Solanum xanthocarpum*, Leaf, roots, fruits, stem, acetone extract, methanol extract, ethanol extract, freshpart, sun dried powder, *Staphylococcus aureus*, *Escherichia coli*.

Introduction:

Plants used for traditional medicine contain a wide range of substances that can be used to treat chronic diseases. (Perumal B et al; 2015).

There exists abundant knowledge, information and benefits of herbal drugs in our ancient literature of Ayurveda (Traditional Indian Medicine) (Gagandeep et al., 2010) In developing countries and especially in India low income people such as farmers, people of small isolated villages and native communities use folk medicine from some plants for the treatment of common infections. One such medicinally important plant used by the tribe living in Palghar district of Maharashtra is *Solanum xanthocarpum*. *Solanum Xanthocarpum* is well versed in India and Pakistan; often in wastage places, on roadsides and in open spaces as well..(Zafar M., Khan M.A., et al 1970.)

Roots, leaves, stems, flowers and fruits are useful parts of Ayurvedic medicinal herbs.(Amir and Kumar, 2004). Studies indicate that *S. xanthocarpum* possesses antifertility, antipyretic, anticancer, anti allergy, anti-inflammatory, antihistamine, hypoglycemic, antibacterial, antioxidant, antifungal properties (Yoshida and Oudhia, 2006).

Roots of the plant are used to treat piles. Juice of leaves cure migraine, asthma, headache, toothache. Fruits are used for curing sore throats and treatment of diabetes, and also exhibit antimicrobial activity. Seeds are used in the treatment of asthma, cough and chest pain. (Okram Mukherjee Singh, *et al* October 2010).

The main objective of this study was to take into account the important aspect of antibacterial potential of different parts of *Solanum xanthocarpum*. The main reason for choosing this plant among the diversity is the reality that local people often employ this important plant as folk medicines for various infections. It is thus essential to assess the medicinal plants scientifically for its effects against various infections. Secondary plant metabolites (phytochemicals) have been extensively investigated as a source of medicinal agents. Thus, it is anticipated that a photochemical with adequate antibacterial efficiency can be used for the treatment of bacterial infection.

Materials And Methods:

Materials:

Plant sample:-Different parts of *Solanum xanthocarpum* like roots,stem, fruits, stem(dried powdered and fresh)

Standard antibiotic: Gentamicin 2µg/ml

Culture of Test organisms:- 18 hrs old pure cultures of

- A) *Salmonella typhi*
- B) *Escherichia coli*
- C) *Klebsiella pneumoniae*
- D) *Staphylococcus aureus*

Medium used: Sterile Muller -Hinton agar

Methods:

Collection of Plant Material: Parts of *Solanum xanthocarpum* like stem, roots, flowers, fruits were collected from the village Boisar,Palghar,Maharashtra, India. The collected plant material was brought to the laboratory for further analysis.

Processing of Plant Material: The collected plant material was brought to laboratory, washed with water, cleaned with 1% mercuric chloride,sundried dried thoroughly and ground into powder- to prepare the dry powder

The fresh parts of the plants were washed with water, cleaned with 1% mercuric chloride and processed for the extraction of methanol and acetone.

Preparation of methanolic and acetonc extract-The 1 gm of dried powdered materials of parts of the plants were extracted individually thrice with each time using 100 ml of methanol and acetone by maceration for seven days at room temperature. The same procedure was followed for the fresh part solvent extraction using acetone and methanol.

Antimicrobial assay: The antifungal and antibacterial activity against the Gram positive and Gram negative bacteria for the dried and fresh part plants extract was determined by. disc diffusion method, where the standard antibiotic used was Gentamicin.

Clinical Laboratory Standards Institute,CLSI document M2-A9, 26:1 2006. Was used as the standard reference for carrying out the disc diffusion assay for determining the antibacterial activity of the plant extracts against the pathogens.

Observations:

Observation Table:-

Zone of Inhibition of Gentamicin (2µg/ml)

Micro organisms	Zone of inhibition (mm)
<i>S.aureus</i>	37
<i>Salmonella typhi</i>	26
<i>E.coli</i>	37
<i>K.pneumoniae</i>	23

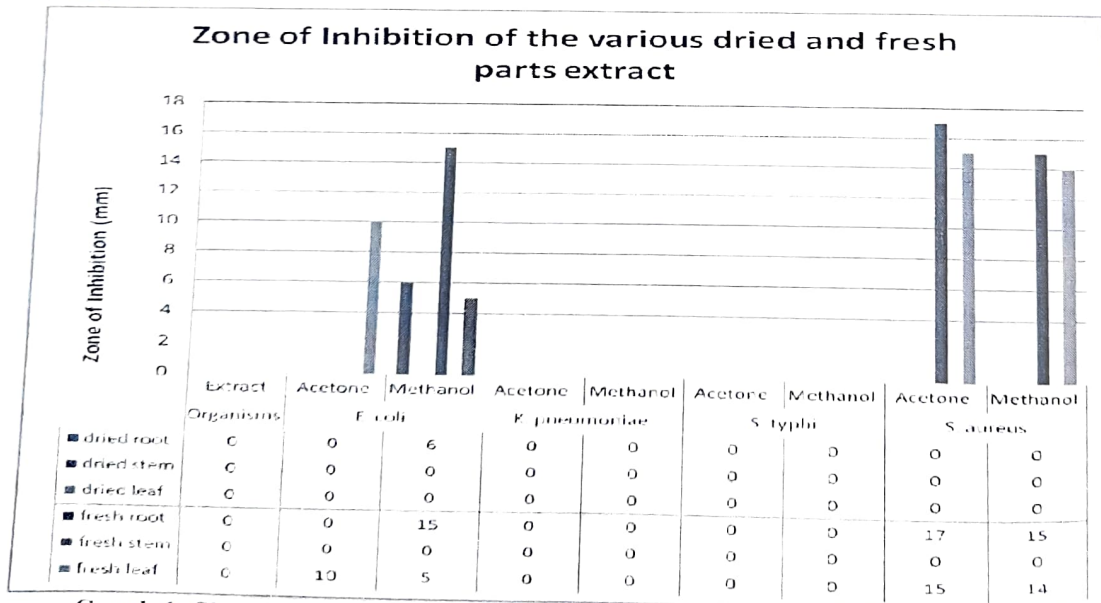
Table 1

Organisms	Extract	Diameter Of Zones Of Inhibition(mm)					
		DR	DS	DL	FR	FS	FL
<i>Escherichia coli</i>	Acetone	-	-	-	-	-	10
	Methanol	6	-	-	15	-	05
<i>Klebsiella pneumoniae</i>	Acetone	-	-	-	-	-	-
	Methanol	-	-	-	-	-	-
<i>Salmonella typhi</i>	Acetone	-	-	-	-	-	-
	Methanol	-	-	-	-	-	-
<i>Staphylococcus aureus</i>	Acetone	-	-	-	17	-	15
	Methanol	-	-	-	15	-	14

Table 2

KEY:- DR:- Dry root extract; DS:- Dry stem extract; DL:- Dry leaves extract; FL:- Fresh leaves extract; FR:- Fresh root extract; FS:- Fresh stem extract; - :- No zone of inhibition

GRAPH:



Graph 1: Showing Zone of Inhibition of the various dried and fresh parts extract

Results and Discussions:

From the study carried out by Shelly Rana (2016), the methanolic and acetonetic fresh leaf extracts were efficient in inhibiting the pathogenic culture of *Staphylococcus aureus*. The present study results coincided with the study carried out by Shelly Rana, (2016) where the zones of inhibition obtained in present study were 15 mm for acetonetic extract and 14 mm for methanolic extracts against *Staphylococcus aureus*. In a similar study carried out by Shelly Rana et al. 2016, similar results were obtained where the acetonetic and methanolic fresh root extracts were potent in inhibiting *Staphylococcus aureus* (zone of inhibition=17mm and 15mm respectively).

In the study carried out by Khizar Abbas et al, 2014, it was observed the methanolic and acetonetic extracts of the dried fruit powder was effective against *Escherichia coli*. The present study also has similar results. The fresh leaf acetonetic extract (zone of inhibition =10mm), leaf methanolic extract (zone of inhibition=05mm) and dried root methanol extract(zone of inhibition= 6mm) inhibited *Escherichia coli*. The fresh root methanolic extract (zone of inhibition=15mm) efficiently inhibited gram negative *Escherichia coli*.

No inhibition against *Klebsiella pneumoniae* and *Salmonella typhi* was observed for any of the acetonetic and methanolic extracts obtained for fresh and dried powdered parts of *Solanum xanthocarpum*, in the present study. But in the study carried out by Khizar Abbas et al, the methanolic and acetonetic extracts of the dried powder of the fruits significantly inhibited *Klebsiella pneumoniae* and *Salmonella typhi* (Khizar Abbas et.al., 2014).

From the phytochemical studies carried out by Okram Mukherjee Singh, et al., it was found that many of the antimicrobial phytochemicals are soluble in methanol when extracted using the fresh parts of the plant. (Okram Mukherjee Singh et.al., October 2010.) In the present study it was found that the methanolic fresh root and fresh leaf extracts showed the larger zone of inhibition in comparison to the dried powdered extracts.

Conclusions:

From the study carried out, we can conclude - the methanolic and acetonetic extracts of fresh leaf potently inhibited both gram positive (*Staphylococcus aureus*) and gram negative (*Escherichia coli*) bacteria and methanolic extract fresh root of *Solanum xanthocarpum* were efficient in inhibiting the growth of *Escherichia coli*. The dried root and fresh root methanol extract showed the inhibition against *Escherichia coli*. Neither the acetonetic and methanolic fresh or dried powdered extracts proved inhibitory against gram negative pathogenic bacteria viz *Salmonella typhi* and *Klebsiella pneumoniae*.

No inhibitory effects against any of the test organisms were observed for the dried stem and leaves or fresh extracts of stem.

Therefore from the study conducted, it can be inferred that most of the phytochemicals exhibiting the antimicrobial activity are effective against *Staphylococcus aureus* and *Escherichia coli* in their fresh form in comparison with the dried powdered extracts. The antimicrobial phytochemicals extracted from fresh leaves and fresh roots were more soluble and exhibited potent inhibitory action when extracted in methanol.

References:

1. Abhishek, M., Rakshanda, B., Prasad, G.B.K.S., Dua, V.K., Satish, K., Pavan, K.A. 2010. Antimicrobial activity of plants traditionally used as medicine against some pathogens. Rasayan J. Chem., 615-620.