



SHRI SHIVAJI EDUCATION SOCIETY, AMRAVATI'S
SHRI SHIVAJI COLLEGE OF ARTS, COMMERCE AND SCIENCE, AKOLA (MS)
Affiliated with Sant Gadge Baba Amravati University, Amravati (MS)
UGC Status- College with Potential for Excellence (Phase II Completed)
DST- FIST (Level "00") Support;
Lead College Status by S. G. B. Amravati University, Amravati (MS)
Website: www.shivajiakola.ac.in

DVV : 3.5.1.

**Copies of collaboration/related documents of (institution's name)
indicating the nature of collaboration and activities the year 2016-17,
2017-18 , 2018-19 and 2019-20, 2020-21 are provided for DVV.**

Shri Shivaji Education Society, Amravati's

SHRI SHIVAJI COLLEGE OF ARTS, COMMERCE AND SCIENCE, AKOLA



NAAC Re-Accredited with A grade with CGPA 3.24
UGC Status of 'College with Potential for Excellence', DST-FIST level- 0 Support

Lead College status by S.G.B.A.U. Amravati

Near Shivaji Park, Akola - 444 001 (Maharashtra)

Phone & Fax : 0724-2410438/2411039

Website : shivajiakola.ac.in E-mail : principal@shivajiakola.ac.in



Late Dr. Panjabrao Deshmukh
Founder President

Hon. Harshvardhan Deshmukh
President

Dr. Ambadas L. Kulat
Principal

No. SSC/AKL/

Date 15-12-2021

Declaration

This is to declare that the information, reports, true copies and numerical data etc. furnished in this file as supporting documents is verified by IQAC and found correct.

Hence this certificate.

Dr. A. S. Raut
Dr. A. S. Raut
IQAC Co-ordinator
Shri Shivaji College of Arts,
Commerce & Science, AKOLA

Dr. A. L. Kulat
PRINCIPAL
Shri Shivaji College of Arts,
Commerce & Science, AKOLA
A Grade C.GPA. 3.11, by NAAC

DVV- 3.5.1: Copies of collaboration/related documents of (institution's name) indicating the nature of collaboration and activities the year 2016-17, 2017-18 , 2018-19 and 2019-20, 2020-21 are provided for DVV.

List of Collaborative activities for research, faculty exchange, student exchange/ internship per year.

Sl. No.	Title of the collaborative activity	Name of the collaborating agency with contact details	Name of the participant	Duration	Nature of the activity
1	Research work	Department of Microbiology, Govt. Medical College, Akola	S. S. Kadu, G. V. Korpe and R. P. Karyakarte	2016-17	Research paper Publication
2	Research work	Dept of Zoology RLT College, Akola	A. S. Sawarkar and S. B. Sawarkar	2016-17	Research paper Publication
3	Research work	SSVP's Late Karmveer Dr. P. R. Ghogare College Dhule	R. G. Mahalle and R. B. Mohod	2016-17	Research paper Publication
4	Research work	Department of Botany, D. B. Science College, Gondia	D. K. Koche and M. V. Kawale	2016-17	Research paper Publication
	Training Program	Tata Consultancy Services	Dr. P. S. Kokate and Mr. Nitin Mohod	2016-17	Training to students
5	Students Exchange	Florentis Pharmaceuticals Pvt. Ltd.	1. Mr. Yogesh Tanpure, 2. Mr. Rushikesh wakode, 3. Ms. Prita Mahajan, 4. Ms. Poonam Nawkar	2017-18	Project Work
6	Research work	Nuclear Agriculture and Biotechnology Department, BARC Mumbai	P. R. Bhogawar D.K. Koche, A. Joshi Saha	2017-18	Research paper Publication
7	Research work	Nuclear Agriculture and Biotechnology Department, BARC Mumbai	P. R. Bhogawar D.K. Koche, A. Joshi Saha	2017-18	Research paper Publication
8	Research work	Nuclear Agriculture and Biotechnology Department, BARC Mumbai	P. R. Bhogawar D.K. Koche, A. Joshi Saha	one week	Research paper Publication

9	Research work	Department of Botany, D. B. Science College, Gondia	D. K. Koche and M. V. Kawale	one week	Research paper Publication
10	Research work	Department of Botany, Shri Dr. R. G. Rathod College, Murtizapur	Deepak Koche and Rupali Shirsat	one week	Research paper Publication
11	Students Exchange	Shri R. L. T. Science College, Akola	1. Mr. Rajat Vijay Saoji, 2. Mr. Sachin Balaji Borekar, 3. Ms. Pooja Diliprao Bhoyar, 4. Ms. Ashwini Vijay Huse	2017-18	Project Work
12	Research work	Dept of Zoology RLT College, Akola	A. S. Sawarkar and S. B. Sawarkar	2017-18	Research paper Publication
13	Project guidance	Microspectra Pvt. Ltd.	V. M. Patil and Dr. D. N. Besekar	2017-18	Project guidance to student
14	IT training	Lo- Tech Pro	V. M. Patil and Dr. D. N. Besekar	2017-18	IT training to students
15	State level seminar	Indian Science Congress Association Amravati Chapter	Dr. P. S. Kokate, Dr. D. K. Koche, Dr. V. S. Patil, Dr. S. S. Suradkar	2017-18	State level seminar for researcher and students
16	Varhad Lok-kala Sammelan	Maharashtra Sahitya Sanskruti Mandal, Mumbai in collaboration with Warhad Shaikshanik, Samajik, Sanskrutik Bahuuddeshiya Sanstha, Loni.	Dr. S. W. Kharche, Dr. S. D. Patil, Dr. S. S. Pohare, Mr. Vinay Paikine	2018-19	Folk meet as the cultural feast for students
17	Research work	J. D. Patil Sangludkar Mahavidyalaya, Daryapur	S. S. Kadu and G. V. Korpe	2017-18	Research paper Publication
18	Research work	Department of Physics, G. V. I. S. H. Amravati (MS)	Ishaque Ahmed Khan, M. R. Belkhedkar, R. V. Salodkar, and A. U. Ubale	2018-19	Research paper Publication
19	Research work	Dept of Zoology RLT College, Akola	A. S. Sawarkar and S. B. Sawarkar	2018-19	Research paper Publication
20	Research work	J. D. Patil Sangludkar Mahavidyalaya, Daryapur	S. S. Kadu and G. V. Korpe	2018-19	Research paper Publication
21	Research work	Nuclear Agriculture and Biotechnology Department, BARC Mumbai	P. R. Bhogawar D.K. Koche, A. Joshi Saha	2018-19	Research paper Publication

22	Students Exchange	Florentis Pharmaceuticals Pvt. Ltd.	1. Mr. Owais Ahmad, 2. Mr. Mohd tanveer, 3. Mr. Faizan Ahmad, 4. Mr. Mohd Aamir, 5. Mr. Abhijit Ambuskar.	2018-19	Project Work
23	Students Exchange	Shri R. L. T. Science College, Akola	1. Ms. Komal N. Gomase, 2. Ms. Mayuree S. Wadal, 3. Mr. Mohd. Tanveer Faizan Ahmad Khan	2018-19	Project Work
24	Research work	Nuclear Agriculture and Biotechnology Department, BARC Mumbai	Deepak Koche and Archana Joshi Saha	2019-20	Research paper Publication
25	Research work	Department of Chemistry, Science College Pouni, Dist-Bhandara	A. B. Sahare and R. B. Mohod	2019-20	Research paper Publication
26	Research work	Department of Chemistry, Science College Pouni, Dist-Bhandara	A. B. Sahare and R. B. Mohod	2019-20	Research paper Publication
27	Research work	Department of Chemistry, Science College Pouni, Dist-Bhandara	A. B. Sahare and R. B. Mohod	2019-20	Research paper Publication
28	Research work	Department of Chemistry, Science College Pouni, Dist-Bhandara	A. B. Sahare, R. B. Mohod and K. D. Kamble	2019-20	Research paper Publication
29	Research work	Department of Chemistry, Institute of Chemical Technology, Mumbai-19	D. S. Deshmukh and V. S. Shende and B. M. Bhanage	2020-21	Book Chapter Publication
30	Research work	Department of Chemistry, Institute of Chemical Technology, Mumbai-19	D. S. Deshmukh and V. S. Shende and B. M. Bhanage	2020-21	Research paper Publication
31	Research work	CSIR- National Chemical Laboratory- Pune	M. T. Sangole and S. M. Thorat	2019-20	Research paper Publication
32	Research work	Vidyabharati College, Selloo Dist- Wardha	M. T. Sangole and S. M. Thorat	2019-20	Research paper Publication
33	Research work	Department of Physics, G. V. I. S. H. Amravati (MS)	M. R. Belkhedkar, R. V. Salodkar, C.C.Chaudhari, S.B.Saw arkar and A.U.Ubale	2019-20	Research paper Publication

34	Research work	Department of Physics, G. V. I. S. H. Amravati (MS)	M. R. Belkhedkar, R. V. Salodkar, K.D.Sarode, S.B.Sawarkar and A.U.Ubale	2019-20	Research paper Publication
35	Skill development- One day workshop on Bonsai Preparation	Akola Garden Club, Akola	Dr. P. S. Kokate, Dr. D. K. Koche, Dr. V. S. Patil	2018-19	Skill development
36	Poster Competition	Indian Science Congress Association Amravati Chapter	Dr. P. S. Kokate, Dr. D. K. Koche and Dr. V. S. Patil	2018-19	Poster Competition
37	2nd Warnhad Lok- kala sammelan	Maharashtra Sahitya Sanskruti Mandal, Mumbai in collaboration with Warhad Shaikshanik, Samajik, Sanskrutik Bahuuddeshiya Sanstha, Loni.	Dr. S. W. Kharche, Dr. S. D. Patil, Dr. S. S. Pohare, Mr. Vinay Paikine	2019-20	Folk meet as the cultural feast for students
38	Research work	Department of Physics, G. V. I. S. H. Amravati (MS)	M. R. Belkhedkar, Mohd. Razique, R. V. Salodkar, S. B. Sawarkar, A. U. Ubale	2019-20	Research paper Publication
39	Students Exchange	Florentis Pharmaceuticals Pvt. Ltd.	1. Mr. Lalit Chavhan, 2. Mr. Yogesh Sachwani, 3. Mr. Nikhil Kshirsagar, 4. Mr. Azhar Mehmood	2019-20	Project Work
40	Students Exchange	Shri R. L. T. Science College, Akola	1. Ms. Poonam B. Sabe, 2. Ms. Sneha D. Dahnde, 3. Ms. Leena B. Arbat, 4. Ms. Archana U. Kalane	2019-20	Project Work
41	Students Exchange	Shri R. L. T. Science College, Akola	1. Ms. Vaishali P. Patil, 2. Ms. Sameena Kausar, 3. Ms. Priya Mankar, 4. Ms. Kajal Panjavani	2020-21	Project Work
42	Research work	Department of Physics, SGBAU Amaravati University, Amaravati	R.G.Korpe N.S. Bajaj, G.V.Korpe, and S.K. Omanwar	2020-21	Research paper Publication
43	Research work	Department of Physics, SGBAU Amaravati University, Amaravati	R. G. Korpe, K. A. Koparkar, N. S. Bajaj and S. K. Omanwar	2020-21	Research paper Publication
44	Research work	Department of Physics, SGBAU Amaravati University, Amaravati	R.G.Korpe, and S.K. Omanwar	2020-21	Research paper Publication

45	Research work	Shri Shankarlal Khandelwal College, Akola	J. Bhale and S.K. Devade	2020-21	Research paper Publication
46	Research work	Shri Shankarlal Khandelwal College, Akola	D.A. Zope, J.V. Bhale and S.K. Devade	2020-21	Research paper Publication
47	Inter-University Poster Competition	Indian Science Congress Association Amravati Chapter	Dr. P. S. Kokate, Dr. D. K. Koche and Dr. V. S. Patil	2019-20	Poster Competition
48	International E-conference	Indian Science Congress Association Amravati Chapter	Dr. P. S. Kokate, Dr. D. K. Koche, Dr. V. S. Patil, Dr. A. V. Oke, Dr. P. D. Deshmukh, Dr. R. N. Patil, Mr. N. B. Choukhande, Mr. S. A. Ratho	2020-21	Scientific feast for researcher and students
49	Research work	Department of Physics, DAVV, Indore (MP)	Jaishree Bhale, Mona Gupta, Pradeep Sharma, A. Mishra	2020-21	Research paper Publication
50	Research work	Nuclear Agriculture and Biotechnology Department, BARC Mumbai	P. R. Bhogawar D.K. Koche, A. Joshi Saha	2020-21	Research paper Publication
51	Research work	Department of Botany, Shri Dr. R. G. Rathod College, Murtizapur	Deepak Koche and Rupali Shirsat	2020-21	Research paper Publication
52	Research work	Department of Geology, Institute of Science, Aurangabad (MS) & Department of Geology, SPPU Pune (MS)	Madhvi Dubey, Satish Deshpande, Satyajit Gaikwad, Ganesh Gaikwad and Ashish Dongre	2020-21	Research paper Publication
53	Research work	Department of Physics, SGBAU Amaravati University, Amaravati	K. A. Koparkar, N.S. Bajaj, S. K. Omanwar	2020-21	Research paper Publication
54	Research work	Department of Physics, SGBAU Amaravati University, Amaravati	K. A. Koparkar, N.S. Bajaj, S. K. Omanwar	2020-21	Research paper Publication
55	Internship of students	Geotech GIS Institute and Consultancy services, Aurangabad (MS)	Ankita Dharme, Mohini Jayale, Sneha Pande, Shubham Ghayal, Bhagyashri Natkar and Satyam Raut	2020-21	Internship

56	Internship of students	Geotech GIS Institute and Consultancy services, Aurangabad (MS)	Mira Kale, Ashwini Khadase, Ashwini Pawar, Pooja Bajad, Gayatri Gawande, Mayuri Pawar, Shubhangi Galat	2020-21	Internship
57	Summer research training	CSIR	Shraddha Dongare, Prachi Holkar, Mohan Duratkar, Sachin Rathod, Priyanka Gote, Vanshika Padiya	2020-21	Summer research training
58	Research work	Shri. Dr. R. G. Rathod College of Arts and Science, Murtizapur	Ruchita Gandhi, Rupali Shirsat, Shubham Rathod and Deepak Koche	2020-21	Research paper Publication
59	Seminar competition and Webinar	Indian Science Congress Association Amravati Chapter	Dr. P. P. Ade, Dr. H. P. Sapkal, Dr. U. V. Lande, Dr. T. Deshmukh, Dr. S. Gawande, Dr. P. Ramteke	2020-21	Seminar Competition and Webinar
60	National Virtual Seminar competition	Mycological Society of India	Dr. P. S. Kokate, Dr. D. K. Koche, Dr. V. S. Patil, Dr. A. V. Oke, Dr. P. D. Deshmukh, Dr. R. N. Patil, Mr. N. B. Choukhande, Mr. S. A. Rathod	2020-21	National Virtual Seminar Competition

Proofs of -


Collaborative Activities organized by College 01-24
Students exchange/ Internship/ collaboration 24-71
Collaboration for research72- 97




PRINCIPAL
Shri Shivaji College of Arts,
Commerce & Science, AKOLA
A Grade C.GPA.3.24 by NAAC

Collaborative Activities organized by Various Departments of College

1) 'Free employability Training', organized by Shri Shivaji college of Akola Under affirmative action training program by TCS, (8th - 25th Sept. 2016)



**SANT GADGE BABA
AMRAVATI UNIVERSITY**
AMRAVATI - 444602
(M.S.)

☎ 2662206, 2662207, 2662208, 2662249, 2662358 FAX NO. 0721-2662135, 2660949 GRAM SGBAMUNI
website www.sgbau.ac.in

To, No. SGBAU/Adult Edu./526/611 /2016
Date-01/09/2016

**The Principal,
All affiliated colleges,
Sant Gadge Baba Amravati University,
Amravati.**

Greetings for the day !
It was a pleasure speaking to you and we appreciate the interest shown by you in our CSR program - "Affirmative Action".
The TATA Consultancy Services & Department of Adult, Continuing Education & Extension Services - Affirmative Action training program aims at providing **Free Employability Training** to the students from SC/ST/EBC & Marginalized community of Minority background.
This 100 hours training comprises the following curriculum:

- English communication & Grammar pertaining to practical use in the business world.
- Vocabulary
- Email etiquettes
- Soft Skills
- Resume building
- Interview facing skills
- Analytical skills

At the conclusion of 100 hours (20 days/5 hrs. per day) training they will receive a TCS Certificate of completion & appreciation which will increase their employability in the corporate world.
In addition, post training TCS Recruitment team will conduct a campus recruitment drive and the candidates who successfully clear our selection process will be selected for TCS-BPS back office operations role.

We look forward to working jointly with your help and support for our common cause of upliftment of the SC/ST and the underprivileged.

Request you to kindly share the list of interested candidates (in attached sheet), training venue and batch start date

Eligibility Criteria :

- ✓ 2016 & 2015 Graduates from BA, B Com & B.Sc.(Except IT & CS)
- ✓ Candidates must have cleared their Supplementary or ATKT exams.
- ✓ Only full time graduation (with 15 years regular education) will be considered - No correspondence courses /undergraduates
- ✓ Batch size required - 60 students
- ✓ 100% SC/ST students required in a batch. In case the registration from SC/ST is less then you may take minimum 60% SC/ST and 40% Other EBC/Minority. The students from the other category would be from financially weaker sections with family income of Rs.2 lakhs pa or less.

Technical Requirement :

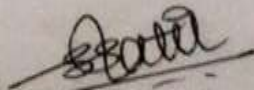
- ✓ Auditorium/ Classroom with a Projector and a Screen
- ✓ Sound System (which can be connected to Laptop) and a Mic
- ✓ Computer Lab with internet access

30 - Students pass out - 2015-16
30 - Students final year - 2016-17

Total Enrolled students - 60

*Mr. Nitin Mahadkar
for necessary action.*

PRINCIPAL
Shri Shivaji College, of Arts
Commerce & Science, AKOLA
A GRADE C.G.P.A. 3.24., BY NAAC


Dr. Shrikant Patil
Director,
Adult, Continuing Education & Extension Services
Sant Gadge Baba Amravati University, Amravati



Inaugural program of Free Employability Training program
 On the dais Chairman- Shri Mahadeoraoji Bhuibhar, Vice President Shri Shivaji Education Society, Amravati, Chief Guest Dr. M. Chandekar, Vice- Chancellor, Sant Gadge Baba Amravati University, Amravati, Dr. Shrikant Patil, Dr. S. G. Bhadange (Principal) Dr. A. S. Raut (Coordinator- IQAC) and Dr. Neetin Mohod (Program Coordinator) and Trainer of TCS



A training session in the Free employability training camp.

अकोला भास्कर

● अकोला ● बुलडाणा ● वाशिम

14 जेष्ठ-कनिष्ठ महागौरी...

शुक्रवार

09 सितंबर 2016

15 दि

संत गाडगेबाबा अमरावती विश्वविद्यालय के कुलगुरु डा.मुरलीधर चांदेकर की अपील डिजिटल इंडिया के लिए चुनौतियां स्वीकारें छात्र

संवाददाता | अकोला

शिक्षा की बदलती धार में सूचना तकनीक ने क्रांति ला दी है। ऐसे माहौल में हर अध्यापक यह प्रयास करे कि वह छात्र के कल्याण में योगदान दे सके। उस के साथ ही छात्रों की जिम्मेदारी भी बनती है कि वे ई-युग में चुनौतियों को आत्मसात करने के लिए अपने आप को बौद्धिक व शारीरिक रूप से सक्षम बनाएं यह समय की मांग है। तभी हम प्रधानमंत्री के डिजिटल इंडिया का ख्वाब पूरा कर सकते हैं। ऐसे विचार संत गाडगेबाबा अमरावती विश्वविद्यालय के कुलगुरु डा.मुरलीधर चांदेकर ने व्यक्त किए। वे आज अकोला के श्री शिवाजी महाविद्यालय में आयोजित नि:शुल्क रोजगार प्रशिक्षण समारोह के उद्घाटक के रूप में



मार्गदर्शन करते हुए बोल रहे थे। यह आयोजन टाटा कन्सलटन्सी सर्विसेस, निरंतर शिक्षा एवं विस्तार विभाग तथा संत गाडगेबाबा अमरावती विश्वविद्यालय के संयुक्त तत्वावधान में किया गया था।

बदलते शैक्षिक परिवेश में छात्रों को रोजगार के अवसरों की जानकारी देने के लिए आयोजित कार्यक्रम की अध्यक्षता श्री शिवाजी शिक्षा संस्था के उपाध्यक्ष महादेवराव भुईंभार ने की। समारोह में प्रमुख अतिथि के

रूप में डा.श्रीकांत पाटिल, डा.गणेश मालटे, मोहम्मद अकबर की प्रमुखता से उपस्थिति रही। समारोह में महाविद्यालय के प्राचार्य डा.सुभाष भडोगे, डा.आशीष राऊत, प्रा.नितिन मोहोड भी उपस्थित थे। कार्यक्रम के आरंभ में दीपप्रज्वलन तथा कुलगुरु का स्वागत किया गया। कार्यक्रम की प्रस्तावना प्रा.नितिन मोहोड ने की। कुलगुरु डा.चांदेकर ने आगे कहा कि स्नातक की पढ़ाई के दौरान गरीब छात्रों को कमाओ तथा पढ़ो योजना के माध्यम से महाविद्यालय जो सहयोग दे रहा है वह अभिनंदनीय है। जबकि डा.श्रीकांत पाटिल ने रोजगार तथा सेवा अवसरों की जानकारी दी। कार्यक्रम का संचालन प्रा.जया काले ने जबकि आभार डा.प्रतीक्षा कोकाटे ने माना।

News Covered about the Inaugural function of Training and placement workshop conducted by TATA Consultancy at Shri Shivaji College of Arts, Commerce and Science, Akola

2) Workshop on “Project Guidance & Development Platform” was organized by Department of Computer Science in collaboration with Microspectra Pvt. Ltd. (08/08/2017)



Shri Shivaji Education Society, Amravati's
Shri Shivaji College of Arts, Commerce and Science, Akola (M.S.)
NAAC Re Accredited with A grade (CGPA 3.24), College With Potential For Excellence and Lead College (Status by SGBAU,Amravati) DIST FIST Support



Department of Computer Science
In Collaboration with
Microspectra
Workshop on
“Project Guidance & Development Platform”
On : 18/08/2017
At
Department of Computer Science



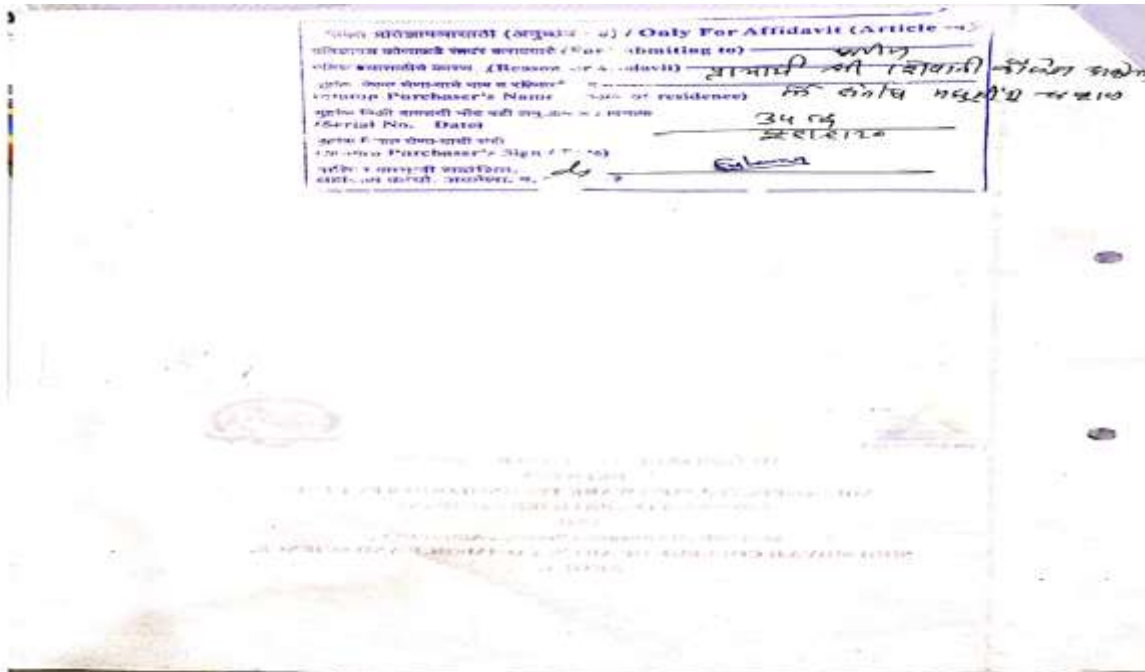
भारतीय गैर न्यायिक
एक सौ रुपये
रु. 1.00
RS. 100
ONE HUNDRED RUPEES
भारत INDIA
INDIA NON JUDICIAL

महाराष्ट्र MAHARASHTRA 2020 WU 903600



MEMORANDUM OF UNDERSTANDING
BETWEEN
MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD
ISO 9001-2015 CERTIFIED COMPANY
AND
Shri Shivaji Education Society , Amravati's
SHRI SHIVAJI COLLEGE OF ART'S, COMMERCE AND SCIENCE,
AKOLA.

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MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD (MSSTPL)

MSSTPL is a Software Development company with proven expertise in software development, Consulting and Mentoring for global enterprises.

MSSTPL is started by a group of seasoned and accomplished IT professionals with a rich blend of complementing expertise essential to make it a successful venture.

MSSTPL has taken several initiatives as part industry collaboration Program for Academic institutes and students on one common platform.

MSSTPL initiative is a form of collaboration that is far reaching and represents a very substantial transformation, a true convergence of the industry and institutes, a convergence of their vision, mission their objectives – in short a joint alliance of a committed team from both Industry and the Institute.

SHRI SHIVAJI COLLEGE OF ART'S, COMMERCE AND SCIENCE, AKOLA. Established in the year 1963 affiliated to **SANT GADGE BABA AMRAVATI UNIVERSITY** situated at **AKOLA**. In February 2016 the college has Reaccredited in third cycle by 'NAAC' with "A" having CGPA "3.24". The college has also been recognized twice by UGC as "College with potential for Excellence". Also Recommended for **DST-FIST level-0**. The College is a leading college with an objective of providing quality education for societies and down-trodden students of the society. The "Computer Science" department has been started with a vision to build technology professionals with a practical Industry exposure to be readily deployable in the Industry.

This MOU is between **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD** and **SHRI SHIVAJI COLLEGE OF ART'S , COMMERCE AND SCIENCE , AKOLA** with a primary objective of "Industry – Educational Institutional Interface" on continuing basis for mutual cooperation and benefit for achieving a harmonious blend of strong points from both sides.

SCOPE AND OBJECTIVE OF THE MOU:

- Implementation of International Certification Program (**MICROSOFT TECHNOLOGY ASSOCIATE**).
- Implementation of **INTERNATIONAL CAMPUS**
- Higher End Technology Sharing
- Collaborative work in R&D projects, academic programs.

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- Jointly organize technical events, Workshop, Seminars, Campus Placement etc.
- Collaborative Working with Internship Program.

This MOU covers the following functions providing way for the institute-Industry link. Following are the areas where we propose to work together to achieve the objectives:

1.1 THE INTERNSHIP PROGRAMME

MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD the pioneers in conceptualizing a unique incubation program aimed at bridging the gap between Industry and Academics by building Industry Ready Engineering Workforce, would like to work in collaboration with Department of Computer Science to further benefit the M.Sc. & B.Sc. students and act as a stepping stone for their bright careers.

The Program includes **THREE, SIX MONTH OR ONE YEAR PROJECT INTERNSHIP** which fulfills the academic requirement of M.Sc. & B.Sc. students of Computer Science department. Joint monitoring will be done for the regular development of the students' projects in Renaissance from time to time by Internal Guide as mutually agreed by both the parties.

1.2 ADJUNCT COURSES

a) The foundation laid down in the academic curriculum has to be complemented by certain application oriented programs which can impart further practical understanding. Based on the feedback from leading Academicians and Industry leaders, **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD** has model certain long term programs to be embedded and run parallel to the existing curriculum of the Computer Science students. The objective of these **ADJUNCT COURSES** is to provide the students an opportunity to learn and practice the most updated technologies relevant from Industry point of view. Each of these course curriculums have been model on international standards with certification and Assessment by Industry Mentors.

b) The **ADJUNCT COURSES** to be run in high end areas like Cloud Computing, Mobile & Wireless Computing, Network Security, Data-mining & Data-Warehousing, OLAP and Web-mining, Hadoop & Big data processing and Mobile Commerce Applications, next generation Web applications, web services, Windows Application, security, etc. shall be concluded with **MINI PROJECTS** to further make the student hands-on with the topic.

c) The requisite **COURSEWARE** and **PARTICIPATION CERTIFICATE** on the proposed courses (covering both Theory and Practical) will be made available to the students by **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD**.

d) The fee structure will be decided on course-to-course basis.

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e) The certification will be done jointly by **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD** and Computer Science department.

1.3 CERTIFICATION PROGRAMS

a) In association with **CERTIPORT** and **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT. LTD** shall conduct "INTERNATIONAL CERTIFICATION PROGRAM" to be offered in association with the Computer Science department of Shri Shivaji College of Art's, Commerce & Science, Akola. The certificate programs will be a certain value addition to the students as they will be eligible for an **INTERNATIONALLY RECOGNIZED CERTIFICATE**. - The certification will be done by the respective International Companies.

b) The following certification programs are proposed in the first phase:

- MTA Program (Microsoft Technology Associate)

1.4 TECHNOLOGY TRANSFER FORUMS

a) **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD** intends to organize "TECHNOLOGY TRANSFER FORUM", on a regular basis in association with the Computer Science department of Shri Shivaji College, Akola to provide students community latest happenings in the IT world.

b) The **TECHNOLOGY TRANSFER FORUM** will be run in association with Computer Science departments of the college.

1.5 GUEST LECTURES AND PLACEMENTS

a) **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD** In association with Computer Science department of this college, shall arrange for seminars/Guest lectures from Industry professionals/HR/Placement Agencies/Technology vendors to interface the students with Global Industry trends as per Mutual Understanding.

1.6 FACULTY TRAINING

a) **MICROSPECTRA** would provide necessary training as an ongoing process on varied Leading edge Technologies and other relevant areas to the faculties /Lecturers /Professors of the Computer Science department of this College.

1.7 PLACEMENT ASSISTANCE

a) **MICROSPECTRA SOFTWARE TECHNOLOGIES PVT LTD** shall jointly work with the **COMPUTER SCIENCE DEPT. OF SHRI SHIVAJI COLLEGE, AKOLA** to place the students successfully into relevant industry after the completion of their respective Degree. Renaissance broad based industry network will be utilized to maximize the placements for the students. Renaissance will work with Computer Science department to get companies on

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campus for recruitment. Both parties (MICROSPECTRA and COMPUTER SCIENCE DEPT.) will implement the above functions effectively with mutual understanding.

b) "Indiajobhub.in" is the placement portal associated with Domestic & International Companies which will collaborate with Students of Computer Science department.

Note: This Memorandum of Understanding is valid till 31st of March 2025.

CEO



(Vijay A Tathe)

Microspectra
For Microspectra Software Technologies Pvt.Ltd.

Authorised Signatories

Date:- 30/09/2020
Place:- Akola.

HOD

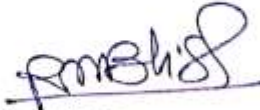


Dr. V. M. Patil

Dept. of Computer Science

HEAD
Department Of Computer
& Science I T
Shri Shivaji College Akola. -

PRINCIPAL



(Dr. R. M. Bhise)

Shri Shivaji College, Akola

PRINCIPAL
Shri Shivaji College of Arts,
Commerce & Science, AKOLA
A Grade C.G.P.A. 3.11, by NAAC



3) A Workshop on “A Complete IT Training Solution” was organized by Department of Computer Science in collaboration with LO TECH PRO, Nashik (31/08/2017)

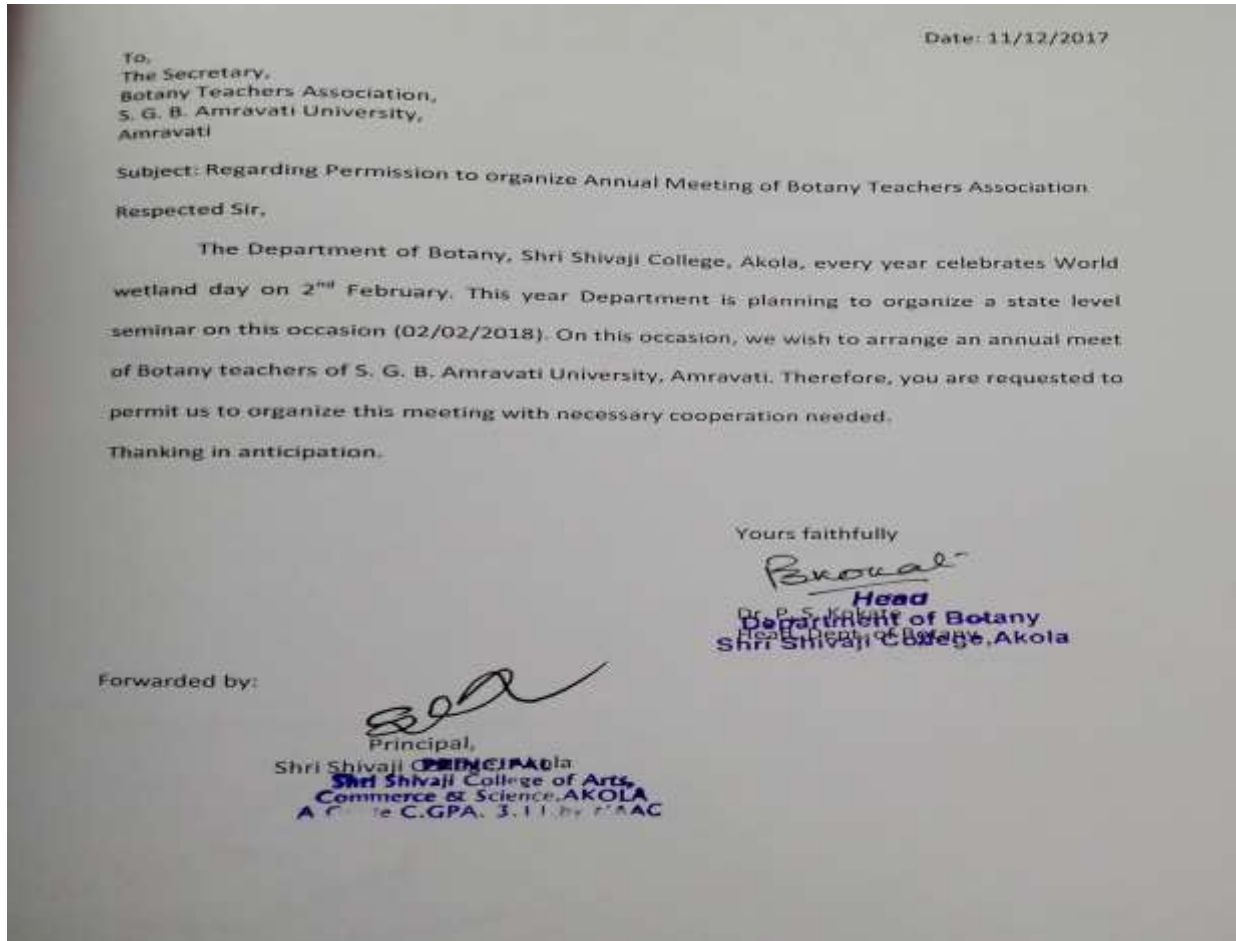


Shri Shivaji Education Society, Amravati's
Shri Shivaji College of Arts, Commerce and Science, Akola (M.S.)
NAAC Re Accredited with A grade (CGPA 3.24), College With Potential For Excellence and Lead College (Status by SGBAU,Amravati) DIST FIST Support

Department of Computer Science
In Collaboration with
Lo-Tech Pro
Workshop on
“A Complete IT Training Solution”
On : 31/08/2017
At
Department of Computer Science



4) State Level Seminar On “ CURRENT SCENARIO OF BOTANICAL RESEARCH”, Organized by DEPARTMENT OF BOTANY, Shri Shivaji College of Arts, Commerce and Science, Akola In Collaboration with S.G.B. Amravati University BOTANY TEACHER’S ASSOCIATION, AMRAVATI (02/02/2018)



Inaugurator Dr. S. R. Manik, Prof. & Head, Department of Botany SGB Amravati University and Secretary, SGB Amravati University Botany Teachers Association, Addressing the gathering






Chief Patron
Shri Harshavardhan Deshmukh
Hon'ble President, Sri Shri Education Society, Amravati

Patron
Dr. Murlidhar V. Chandekar
Hon'ble Vice Chancellor, Sant Gadge Baba Amravati University, Amravati

Patron
All Executive Members
Sri Shri Education Society, Amravati

<p>Chief Organizer Dr. S. G. Bhadange Principal</p> <p>Convener Dr. P. S. Kokate Asst. Prof. & Head, Dept. of Botany</p> <p>Joint-Secretary Dr. V. S. Patil Asst. Professor, Dept. of Botany, Sri Shri Education Society, Amravati</p>	<p>Co-Organizer Dr. A. S. Raut, Coordinator, IQAC</p> <p>Organizing Secretary Dr. D. K. Koche Asst. Professor, Dept. of Botany</p> <p>Treasurer Dr. S. S. Suradkar Asst. Professor, Dept. of Botany, Sri Shri Education Society, Amravati</p>
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State Level Advisory Committee

<p>Prof. Yashpal Sharma, Jammu</p> <p>Prof. Ved Pal Singh, Delhi</p> <p>Prof. N. Arumugam, Pondichery</p> <p>Prof. S. R. Yadav, Kolhapur</p> <p>Prof. Vijay Mendulkar, Mumbai</p> <p>Prof. Prasad Wadegaonkar, Amravati</p> <p>Prof. Milind Sardesai, Pune</p> <p>Prof. C. N. Khobragade, Nanded</p> <p>Dr. S. J. Jambhulkar, Mumbai</p> <p>Dr. Archana Joshi- Saha, Mumbai</p> <p>Dr. O. S. Sarate, Lucknow</p> <p>Dr. Sushma Narkhede, Nagpur</p> <p>Dr. V. B. Gedam, Chandrapur</p> <p>Dr. Surekha Kalkar, Nagpur</p> <p>Dr. E. V. Upadhye, Akola</p> <p>Prof. Dr. S. P. Rothe, Akola</p>	<p>Prof. V. M. Bhale, Akola</p> <p>Prof. S. R. Manik, Amravati</p> <p>Prof. J. A. Tidke, Amravati</p> <p>Prof. A. D. Choudhary, Nagpur</p> <p>Prof. T. Shrinivasu, Nagpur</p> <p>Prof. Arvind Dhabe, Aurangabad</p> <p>Prof. S. S. Mane, Akola</p> <p>Dr. S. N. Malode, Amravati</p> <p>Dr. N. M. Dongarwar, Nagpur</p> <p>Dr. Anil Korpenwar, Nagbhid</p> <p>Dr. N. B. Gaikwad, Kolhapur</p> <p>Dr. N. L. Labhane, Mumbai</p> <p>Dr. A. K. Zingare, Deori</p> <p>Dr. M. C. Kale, Warora</p> <p>Dr. D. G. Bhadange, Akola</p> <p>Dr. Sudeep Roy, Indor</p>
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State Level Seminar
on
'Current Scenario of Botanical Research'
February 2nd, 2018

Venue : Vasant Auditorium



Contact : Dr. P. S. Kokate : 9890647054, Dr. D. K. Koche : 8983027268

PROGRAM SCHEDULE

UGC Sponsored

State Level Seminar

On

CURRENT SCENARIO OF BOTANICAL RESEARCH

2nd February, 2018

Organized by

DEPARTMENT OF BOTANY

Shri Shivaji College of Arts, Commerce and Science, Akola

In Collaboration with

S.G.B. Amravati University

BOTANY TEACHER'S ASSOCIATION, AMRAVATI

Sr. No.	Program	Time
I	Registration	8:30 am to 10:00 am
II	INAUGURAL FUNCTION	10:00 am to 11:15 am
1.	Arrival of Guests	10:00 am to 10:05 am
2.	Vidyapeeth Geet	10:05 am to 10:10 am
3.	Lamp lightening & Garlanding to statue of Dr. Panjabrao Deshmukh	10:10 am to 10:15 am
4.	Floral Welcome and Offering Memento	10:15 am to 10:25 am
5.	Welcome speech Dr. S.G. Bhadange, Honorable Principal, ShriShivaji College, Akola	10:25 am to 10:30 am
6.	Introductory Speech Dr. P.S. Kokate, Head, Dept. of Botany, ShriShivaji College, Akola	10:30 am to 10:35 am
7.	Guest of Honour Speech Dr. S.R. Manik, Secretary, Botany Teacher's Association	10:35 am to 10:40 am
8.	Felicitation Program of Former Heads of Botany Department i. Dr. E. V. Upadhye ii. Dr. D.G. Bhadange iii. Dr. S. P. Rothe	10:40 am to 10:50 am
9.	Speech Dr. E.V. Upadhye	10:50 am to 10:55 am
10.	Inaugural Speech Shri. Nareshchandra Thakre Vice-President, Shri Shivaji Education Society, Amravati	10:55 am to 11:00 am
11.	Souvenir Release By the hands of guests	11:00 am to 11:05 am
12.	Presidential Address Dr. Rajesh Jaypurkar, Honorable Pro-VC, S.G.B. Amravati University, Amravati	11:05 am to 11:10 am
13.	Vote of Thanks - Dr. Dipak Koche	11:10 am to 11:15 am
III	Technical Session - I Keynote Address: Dr. Archana Joshi Saha Sr. Scientist, BARC, Mumbai	11:15 am to 12:15 pm

VALEDICTORY FUNCTION

UGC Sponsored

State Level Seminar

On

CURRENT SCENARIO OF BOTANICAL RESEARCH

2nd February, 2018

Organized by

DEPARTMENT OF BOTANY

Shri Shivaji College of Arts, Commerce and Science, Akola

In Collaboration with

S.G.B. Amravati University

BOTANY TEACHER'S ASSOCIATION, AMRAVATI

SR. NO.	PROGRAM	
1	Arrival of Guests	
2	Floral Welcome of Guests	
3	Oral Feedback	
4	Report Reading	
5	Prize Distribution	
6	Guest of Honour Speech	Dr. S. N. Malode, Associate Professor and Head, Department of Botany, G.V.I.S.H., Amravati
7	Guest of Honour Speech	Dr. V. R. Deshmukh, Former Chairman, BOS, Botany; Former Vice President, BTA and Former Head, Vidyabharti Mahavidyalaya, Amravati
8	Chief Guest Speech	Dr. J. A. Tidke, Professor & Head, Department of Botany; Treasurer-BTA & Former Pro VC, S.G.B. Amravati University, Amravati
9	Presidential Address	Hon'ble, Dr. G. V. Patil, Ex. Vice-Chancellor, S.G.B. Amravati University, Amravati
10	Vote of Thanks	Dr. P. S. Kokate
11	Certificate Distribution	

6) One Day Workshop on Preparation of Bonsai organized by Department of Botany Shri Shivaji College of Arts, Commerce and Science, Akola in collaboration of Akola Garden Club (21/01/2019)



Interactive session of workshop with student participants



Valedictory function of the workshop



Shri Shivaji College of Arts, Commerce and Science, Akola

Department of Botany,

In collaboration with

Akola Garden Club, Akola

Organized

One Day Workshop on Preparation of Bonsai

Date: 21st January 2019



Certificate

This is to Certify that, Mr./ Miss. Ashwini S. Chaudh
M.Sc II (Botany) participated in One Day Workshop
on "Preparation of Bonsai" organized by Department of Botany, Shri Shivaji College
of Arts, Commerce and Science, Akola in collaboration with Akola Garden Club, Akola
on dated 21st January 2019. This certificate is presented for his/ her active participation.

Becoral

Head,

Department of Botany

AmBisf

Principal,

Shri Shivaji College, Akola

A. S. Chaudh

President,

Akola Garden Club, Akola

7) University level Poster competition for UG and PG students organized by Department of Botany, Shri Shivaji College Akola in collaboration with Indian Science Congress Association, Amravati Chapter (05/02/2019)



**Inter-University
Poster Competition**

For UG and PG Students of Life Sciences
**ATTRACTIVE CASH PRIZES,
Mementos and Certificates for Winners**
Date : 05/02/2019 at 11. 00 am onwards



-Organized by-
Department of Botany,
**SHRI SHIVAJI COLLEGE OF ARTS,
COMMERCE AND SCIENCE, AKOLA (MS)**
In Collaboration with
Indian Science Congress Association,
Amravati Chapter (MS)

CONTACT

DR. P. S. KOKATE M : 09890647054 pratika811@gmail.com	DR. D. K. KOCHER 09983027268 dipekkoche43@gmail.com
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The poster features a blue background with a large, glowing DNA double helix structure on the right side. The text is in white and yellow, providing details about the competition, including prizes, date, and organizers. The logo of the Indian Science Congress Association is also present.



Inaugural function of the University Level Poster competition



Guests and Experts observing the students posters



Certificate of the event consists of Signature of ISCA- Amravati Chapter Convener Dr. Atul Bodakhe as ISCA Amravati chapter was collaborator for organizing this event.

9) Inter-University Poster Competition and Photo Exhibition organized by Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola in Collaboration with Indian Science Congress Association, Amravati Chapter (01/02/2020)



Brochure of the Event indicating collaboration with Indian Science Congress Amravati Chapter.





Valedictory function of the competition.



Certificate of the event, having the signature of Collaborative partner ISCA, Amravati Chapter- Convener

10) INTERNATIONAL E- CONFERENCE ON INNOVATIVE RESEARCH TRENDS IN LIFE SCIENCES (ICIRTLS-2020) organized by Department of Life Sciences, Shri Shivaji College of Arts, Commerce and Science, Akola in Collaboration with Indian Science Congress Association, Amravati Chapter (03rd to 5th December 2020)



INTERNATIONAL E-CONFERENCE ON INNOVATIVE RESEARCH TRENDS IN LIFE SCIENCES (3rd, 4th & 5th December 2020)
Organized by Department of Life Sciences

Shri Shivaji Education Society, Amravati's
SHRI SHIVAJI COLLEGE OF ARTS, COMMERCE AND SCIENCE, AKOLA

NAAC Re-Accredited with A-grade with CGPA 3.34
UGC Status of College with Potential for Excellence
HISTRIE Level 00, Joint Degree Status by SDAU, Amravati
Kopar (New) Park, Akola - 431 223 (Maharashtra) (INDIA)
In Collaboration with
INDIAN SCIENCE CONGRESS ASSOCIATION
(Amravati Chapter)

For Registration
<http://forms.gle/1HJE2eXkaApA65dtA>

Participants:

- Dr. D. H. Bhatkar, Amravati
- Dr. T. B. Wadhvani, Amravati
- Dr. R. V. Magdum, Amravati
- Dr. G. S. Dhule, Amravati
- Dr. Manjusha Wale, Amravati
- Dr. Varsha Babar, Amravati
- Dr. S. S. Mase, PDAV Akola
- Dr. N. H. Sakam, Amravati
- Dr. Prashant Bhande, Amravati
- Dr. D. N. Pawale, Amravati
- Dr. R. A. Wagh, Amravati
- Dr. Anil Badhke, Raichurpur
- Dr. V. H. Purohit, Chikhali
- Dr. Manish M. Dhore, Akola
- Dr. H. K. Kumbhar, Rahgaon
- Dr. Vimal Kumbhar, Rahgaon
- Dr. Vijay Bhagat, Akola
- Dr. Vandana Kulk, Rahgaon
- Dr. S. K. Thorat, Rahgaon
- Dr. I. A. Kulk, Rahgaon
- Dr. Manoj Bhagat, Rahgaon
- Dr. V. M. Rajgure, Chanderpur
- Dr. Jashita Bhosale, Rahgaon
- Dr. Manoj Bhagat, Akola
- Dr. Ganesh Bhosale, Chikhali
- Dr. H. R. Kulk, Rahgaon
- Dr. Prashant Anand, Rahgaon
- Dr. S. T. Fandare, Rahgaon
- Dr. Rajesh Bhosale, Rahgaon
- Dr. Simant Bhosale, Rahgaon
- Dr. Savarna Bhosale, Rahgaon
- Dr. N. M. Bhagat, Akola
- Dr. Ravindra Pawar, Akola
- Dr. Anil More, Rahgaon
- Dr. Pratik Theng, Akola
- Dr. R. M. Jadhav, Amravati
- Dr. D. V. Bhatkar, Amravati
- Dr. S. H. Bhatkar, Amravati
- Dr. S. P. Ingole, Amravati
- Dr. Ashish Gade, Amravati
- Dr. Manoj Bhatkar, Akola
- Dr. M. B. Sonekar, Chanderpur
- Dr. Mohanlal Dhore, Akola
- Dr. S. S. Bhatkar, Rahgaon
- Dr. D. S. Jadhav, Akola
- Dr. P. B. Bhatkar, Amravati
- Dr. P. S. Kulk, Raichurpur
- Dr. K. M. Thorat, Rahgaon
- Dr. Ravi Dhore, Akola
- Dr. Santosh Sonekar, Rahgaon
- Dr. G. Manohar, Chikhali
- Dr. D. S. Bhatkar, Rahgaon
- Dr. P. S. Pawar, Raichurpur
- Dr. R. B. Bhatkar, Raichurpur
- Dr. Sanjay Bhatkar, Amravati
- Dr. U. H. Bhatkar, Chikhali
- Dr. S. P. Bhatkar, Chanderpur
- Dr. M. B. Bhatkar, Loner
- Dr. Mohanlal Kulk, Akola
- Dr. P. S. Dhore, Akola
- Dr. Rajesh Sonekar, Akola
- Dr. Manoj Bhatkar, Chanderpur
- Dr. Prashant Bhagat, Raichurpur
- Dr. Vimal Dhore, Rahgaon
- Dr. Santosh Bhagat, Akola
- Dr. Santosh Bhatkar, Akola
- Dr. Ananta Uyan, Akola
- Dr. V. Manohar, Akola
- Dr. S. Y. Dhadke, Rahgaon
- Dr. H. P. Kulk, Rahgaon

Local Organizing Committee

- Dr. S. T. Bhatkar
- Dr. V. S. Patil
- Dr. A. S. Pathe
- Dr. V. M. Patil
- Dr. Anjali Kulkarni
- Dr. H. P. Sapat
- Mr. Shubham Rathod
- Dr. Ujjwal Laxda
- Dr. P. H. Bhatkar
- Dr. Ashwini A. Bhatkar
- Mr. Pawan Giri
- Dr. P. P. Adh
- Dr. S. M. Patil
- Dr. R. V. Sonekar
- Dr. Swati Zolage
- Dr. Ganesh Gokhad
- Dr. Raksha Patil
- Dr. T. G. Deshmukh
- Dr. A. B. Bhatkar
- Dr. Sachin Bhatkar
- Dr. Santosh Nagare
- Mr. Ashok Chaudhari
- Mr. Rajesh Gite
- Dr. S. G. Bhatkar
- Dr. A. B. Bhatkar
- Dr. H. E. Bhatkar
- Dr. S. B. Bhatkar
- Mr. N. B. Chaudhary
- Dr. A. V. Gite
- Dr. P. B. Deshmukh
- Dr. Ravi Dhadke
- Dr. S. B. Misal
- Mr. Mahesh Phalke
- Dr. Milind Shirshate

Chief Patron
Shri Harshvardhan Deshmukh,
Honorable President,
Shri Shivaji Education Society, Amravati (MS)

Patron
Dr. Murlidhar V. Chandekar,
Honorable Vice Chancellor,
Sant Gadge Baba Amravati University, Amravati (MS)
And

Co-Patrons
All Executive Members
Shri Shivaji Education Society, Amravati (MS)

Chief Organizer
Dr. R. M. Bhise
Principal
Shri Shivaji College Of Arts, Commerce And Science, Akola

Co-Organizer

- Dr. A. S. Rout**
Coordinator- IQAC
- Dr. G. V. Korpe**
Director, Research & Extension
- Convener**
Dr. P. P. Umale (Kokate)
Professor & Head, Botany
- Organizing Secretary**
Dr. D. K. Koche
Professor, Department of Botany





Inaugural function of the International e-conference



Glimpses from the key note address and plenary talk

11) Online Seminar Competition cum Webinar on Sustainable Development with Women Empowerment in Relation to Sericulture and Apiculture- organized by Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola in Collaboration with Indian Science Congress Association, Amravati Chapter (12/02/2021)

Shri Shivaji Education Society, Amravati's
**SHRI SHIVAJI COLLEGE OF ARTS,
COMMERCE & SCIENCE, AKOLA**

Department of Zoology & Indian Science Congress Amravati Chapter
Jointly Organizing
Inter University Post Graduate Students Online Seminar Competition Cum Webinar
On

**SUSTAINABLE DEVELOPMENT WITH
WOMEN EMPOWERMENT IN RELATION
TO
SERICULTURE AND APICULTURE**

Date : 15/02/2021 Time : 9: 00 AM

Patron
Hon. Shri Harshvardhanji Deshmukh
President, Shri Shivaji Education Society, Amravati

Dr. (Mrs.) Vijay Laxmi Saxena
General President, Indian Science Congress, Kolkata

Guest of Honor
Dr. Atul Bodkhe
Convener, Indian Science Congress Association Amravati Chapter

Renowned Resource Persons

Dr. M. M. Rathod
Ex-Director, Center for Sericulture & Biological,
Pest Management Research (CSBR)

Dr. V. S. Mangale
Head, Department of Apiculture, Arts,
Commerce and Science College, Chikhaldara

Organizing Committee
Chief - Convener
Dr. R. M. Bhise
Principal
Dr. A. S. Raut
IQAC, Coordinator

Convener
Dr. P. P. Ade
Professor & Head,
Department of Zoology

Organizing Secretary
Dr. H. P. Sapkal
Associate Professor,
Department of Zoology

NATIONAL ADVISORY COMMITTEE

Dr. Ashok Kumar Saxena
Former, General President, Indian Science Congress Association Kolkata

Prof. K. S. Rangappa
Immediate Past General President,
Indian Science Congress Association Kolkata

Prof. Arvind Kumar Saxena
President Elect,
Indian Science Congress Association Kolkata

Dr. S. Ramakrishna
General Secretary (Membership Affairs)
Indian Science Congress Association Kolkata

Dr. Anoop Kr.Jain
General Secretary (Scientific Activities)
Indian Science Congress Association Kolkata

Dr. Sheo Satya Prakash
Treasurer, Indian Science Congress Association Kolkata

Technical Committee

Dr. T. G. Dshmkh
Assistant Professor

Dr. U. P. Lande
Assistant Professor

Dr. S. V. Gawande
Assistant Professor

Dr. P. M. Rameke
Assistant Professor

Dr. A. R. Rajoria
Assistant Professor

Attractive Cash Prizes
Ist Prize – 5000 Rs. | IIndPrize – 3000 Rs. | IIIrdPrize – 2000 Rs.

Registration Fees
100 Rs. Per Students
Phone Pay – Google Pay – Pay Tm Number
9960111271

Terms & Conditions for Seminar Competition

- Only TWO Participants from PG Zoology Department can enroll for Competition.
- Time duration for Presentation will be 7 minutes
- Time duration for Discussion will be 2 minutes (7+2 Minutes)
- Last date for registration along with sign letter of Department/ College is 12-02-2021.
- Seminar will be held on GOOGLE MEET.
- E- Certificates will be provided to all Registered Participants.

Registration link : <https://forms.gle/mHpUNNbg5tSjVJWX6>



12) National Virtual Seminar Competition organized by Department of Botany, in Association with Shri Shivaji Science College Amravati and Mycological Society of India to Celebration of Fungal Awareness Week (27th Sept. 2nd Oct. 2021).

Shri Shivaji Education Society, Amravati's
SHRI SHIVAJI COLLEGE OF ARTS, COMMERCE & SCIENCE, AKOLA
 NAAC Accredited with A grade (CGPA of 3.54) College with Potential for Excellence
 (Given by UGC) UGC College (Given by UGC), Amravati (UPE) UPE College
DEPARTMENT OF BOTANY AND IQAC
 In collaboration with
 Shri Shivaji Science College, Amravati & Mycological Society of India
 Organizing
National Virtual Seminar Competition
 on the occasion of
"WORLD FUNGUS DAY"
 Celebration of Fungal Awareness Week 27th Sep to 2nd Oct 2021
 Theme- Fungal Pathogens of Human, Animals and Plants
 Date- 30th September 2021 Time- 01:00 PM

Chairperson Prof. Dr. R.M. Bhisle Principal, Shri Shivaji College of Arts, Commerce & Science, Akola	Chief Guest Dr. D. V. Hande Council Member of MSU Professor, Department of Botany, Shri Shivaji Science College, Amravati	Guest of Honour Prof. Dr. A. S. Raut IQAC Coordinator, Shri Shivaji College of Arts, Commerce & Science, Akola
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Organizing Committee

Dr. P. P. Umale Professor & Head	Dr. D. K. Koche Professor	Dr. V. S. Patil Professor
Mr. N. B. Choukhande Assistant Professor	Dr. A. V. Oke Assistant Professor	Dr. R. N. Patil Assistant Professor
		Mr. S. A. Rathod Assistant Professor

Rules
 1) Competition is open for all Life Science Students of UG & PG.
 2) Register for competition through given Registration link up to date 28/09/2021.
 3) Length of video should not be more than 5 minutes and submit it on the given submission link.
 4) Submission of good quality video with clear resolution is required.
 5) Video should be relevant to given theme and the presentation language should be English.
 6) Rename video with your own name before submission.
 7) There is no entry fee for participation, last date for submission is 28/09/2021.
 8) Unclear and videos with low resolution will be rejected.
 9) The best three presentation will be awarded by certificate of excellence from each category.
 10) All the participants will get a certificate after submission of feedback.

Registration Link:- <https://forms.gle/m6kR8t8bQn398at4>
 Upload Your Video at this Link <https://forms.gle/3RacD78a339v/HW5>
 CONTACT NUMBER : 9699909507, 9673837065, 8830820778

Shri Shivaji Education Society, Amravati's
SHRI SHIVAJI COLLEGE OF ARTS, COMMERCE & SCIENCE, AKOLA
 NAAC Accredited with A grade (CGPA of 3.54) College with Potential for Excellence
 (Given by UGC) UGC College (Given by UGC), Amravati (UPE) UPE College
Invitation
DEPARTMENT OF BOTANY AND IQAC
 In collaboration with
 Shri Shivaji Science College, Amravati & Mycological Society of India
 Organizing
National Virtual Seminar Competition
 on the occasion of
"World Fungus Day"
 Celebration of Fungal Awareness Week
 27th Sep to 2nd Oct 2021
 Theme- Fungal Pathogens of Human, Animals & Plants
 Date- 30th September 2021 Time- 01:00 PM
 Program Link : <https://meet.google.com/afq-yttf-gig>

Chairperson Prof. Dr. R.M. Bhisle Principal, Shri Shivaji College, Akola	Chief Guest Dr. D. V. Hande Council Member of MSU Professor, Department of Botany, Shri Shivaji Science College, Amravati	Guest of Honour Prof. Dr. A. S. Raut IQAC Coordinator, Shri Shivaji College, Akola
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Jury Panel

Dr. Narendra Shahare Professor & Head Department of Botany, Brijlal Bajaj Science College, Amravati	Dr. Suchita Khodke Assistant Professor & Head Department of Botany, Vasudev Vibhans Mulvanikar, Nasipgan (KJ), Dist. Amravati	Dr. Anjali Sangole Assistant Professor Department of Botany, Sri S. L. S. Science College, Akola
--	--	---

Organizing Committee

Dr. P. P. Umale Professor & Head	Dr. D. K. Koche Professor	Dr. V. S. Patil Professor
Mr. N. B. Choukhande Assistant Professor	Dr. A. V. Oke Assistant Professor	Dr. R. N. Patil Assistant Professor
		Mr. S. A. Rathod Assistant Professor

Brochure of the event



10/02/2017

To,
The Principal,
Shri Shivaji College of Arts, Commerce and Science
Akola, Maharashtra.

Respected Sir,

I am glad to inform you that following students of M.Sc. II Semester VI (Chemistry) from Shri Shivaji College, Akola have successfully completed the Organic Synthesis Technique in our organization at Florentis Pharmaceuticals Pvt. Ltd. from 04 Feb. 2017 to 10 Feb. 2017. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students:

1. Yogesh Tanpure
2. Rushikesh Wakode
3. Priya Mahajan
4. Punam Nawkar

With Best Wishes,

For FLORENTIS PHARMACEUTICALS PVT. LTD.

Dr. Shriram Kotkar

Managing Director,

Florentis Pharmaceuticals Pvt. Ltd.

Tathawade

Pune - 411033



DIRECTOR



The Berar General Education Society's, Akola.

(Regd. No. F65 B'bay Public Trust Act.)

SHRI RADHAKISAN LAXMINARAYAN TOSHNIWAL COLLEGE OF SCIENCE, AKOLA

(R. L. T. COLLEGE OF SCIENCE)

CIVILLINES, AKOLA - 444 001 (MAHARASHTRA)

: Recognized By :

Govt. of Maharashtra & Permanently Affiliated to S. G. B. Amravati University, Amravati.



Ph. No. (0724) 2415480

Fax - (0724) 2415650

Post Box No.- 60

NAAC REACCREDITED

GRADE 'A'

WITH CGPA - 3.12

COLLEGE CODE - 210

Website : www.rltsc.org

E-mail: principal@rltsc.org

L. No.: _____

Date : 08/02/2017

To,

The Principal

Shri Shivaji College of Arts, Commerce and Science

Akola

Respected Sir,

I am glad to inform you that following students of M.Sc. II Semester VI (Chemistry) of your Shri Shivaji College, Akola have successfully completed Nanotechnology Technique in Chemistry department of our Shri R. L. T. College of Science Akola from 03 Feb. 2017 to 08 Feb. 2017. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students

1. Mr. Rajat Vijay Saoji
2. Mr. Sachin Balaji Borekar
3. Ms. Puja Diliprao Bhoyar
4. Ms. Ashwini Vijay Use

Principal
Shri R. L. T. College of
Science, Akola

08/02/18

To,
The Principal,
Shri Shivaji College of Arts, Commerce and Science
Akola, Maharashtra.

Respected Sir,

I am glad to inform you that following students of M. Sc. II Semester VI (Chemistry) from Shri Shivaji College, Akola have successfully completed the Organic Synthesis Technique in our organization at Florentis Pharmaceuticals Pvt. Ltd. from 03 Feb. 2018 to 08 Feb. 2018. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students:

1. Owais Ahmad
2. Mohd Tanveer
3. Faizan Ahmad
4. Mohd Aamir
5. Abhijeet Ambuskar

With Best Wishes, For FLORENTIS PHARMACEUTICALS PVT LTD

Dr. Shriram Kotkar

Managing Director,

Florentis Pharmaceuticals Pvt. Ltd.

Tathawade

Pune - 411033



DIRECTOR



OUR PARTNER IN INNOVATIVE RESEARCH

The Berar General Education Society's, Akola.

(Regd. No. F65 B'bay Public Trust Act.)

SHRI RADHAKISAN LAXMINARAYAN TOSHNIWAL COLLEGE OF SCIENCE, AKOLA

(R. L. T. COLLEGE OF SCIENCE)

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E-mail: principal@rltsc.org

L. No.: _____

Date : 08 / 02 / 2018

To,

The Principal

Shri Shivaji College of Arts, Commerce and Science

Akola

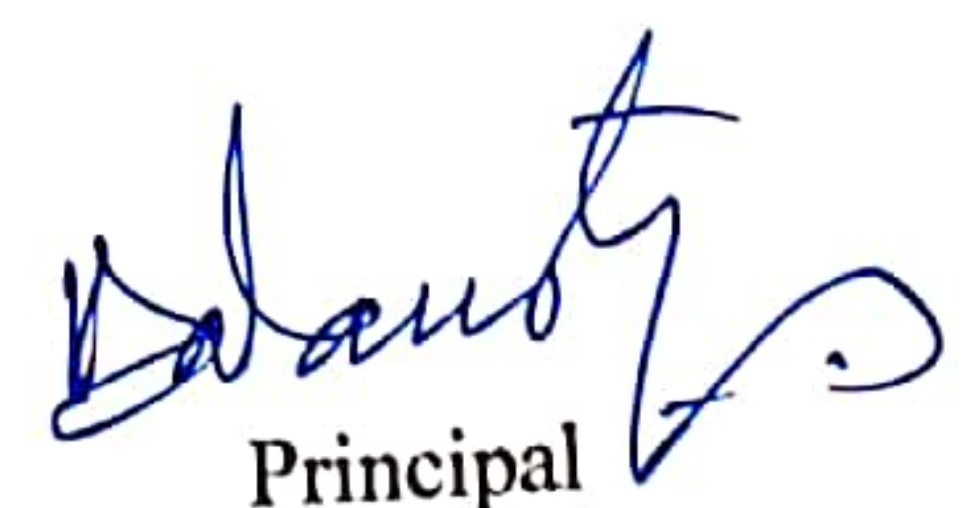
Respected Sir,

I am glad to inform you that following students of M.Sc. II Semester VI (Chemistry) of your Shri Shivaji College, Akola have successfully completed Flame Photometry Technique in Chemistry department of our Shri R. L. T. College of Science Akola college from 03 Feb. 2018 to 08 Feb. 2018. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students

1. Ms. Komal N. Gomase
2. Ms. Mayuree S. Wadal
3. Mr. Mohd. Tanveer Faizan Ahmad Khan



Principal

Shri R. L. T. College of
Science, Akola

12/02/19

To,
The Principal,
Shri Shivaji College of Arts, Commerce and Science
Akola, Maharashtra.

Respected Sir,

I am glad to inform you that following students of M.Sc. II Semester VI (Chemistry) from Shri Shivaji College, Akola have successfully completed the Organic Synthesis Technique in our organization at Florentis Pharmaceuticals Pvt. Ltd. from 05 Feb. 2019 to 12 Feb. 2019. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students:

1. Lalit Chavhan
2. Yogesh Sachwani
3. Nikhil Kshirsagar
4. Azhar Mehmood

With Best Wishes, For FLORENTIS PHARMACEUTICALS PVT LTD

Dr. Shriram Kotkar

Managing Director,

Florentis Pharmaceuticals Pvt. Ltd.

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Pune - 411033



DIRECTOR



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SHRI RADHAKISAN LAXMINARAYAN TOSHNIWAL COLLEGE OF SCIENCE, AKOLA

(R. L. T. COLLEGE OF SCIENCE)

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WITH CGPA - 3.12

E-mail: principal@rltsc.org

L. No.: _____

Date : 08 / 02 / 2019

To,

The Principal

Shri Shivaji College of Arts, Commerce and Science

Akola

Respected Sir,

I am glad to inform you that following students of M.Sc. II Semester VI (Chemistry) of your Shri Shivaji College, Akola have successfully completed Nanotechnology Technique in Chemistry department of our Shri R. L. T. College of Science Akola college from 03 Feb. 2019 to 08 Feb. 2019. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students

1. Ms. Poonam B. Sabe
2. Ms. Sneha D. Dhande
3. Ms. Leena B. Arbat
4. Ms. Archana U. Kalane

Principal

Shri R. L. T. College of
Science, Akola

The Berar General Education Society's, Akola.

(Regd. No. F65 B'bay Public Trust Act.)

SHRI RADHAKISAN LAXMINARAYAN TOSHNIWAL COLLEGE OF SCIENCE, AKOLA

(R. L. T. COLLEGE OF SCIENCE)

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Fax - (0724) 2415650

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Website : www.rltsc.org

Post Box No.- 60

WITH CGPA - 3.12

E-mail: principal@rltsc.org

L. No.:

Date : 08/02/2020

To,

The Principal

Shri Shivaji College of Arts, Commerce and Science

Akola

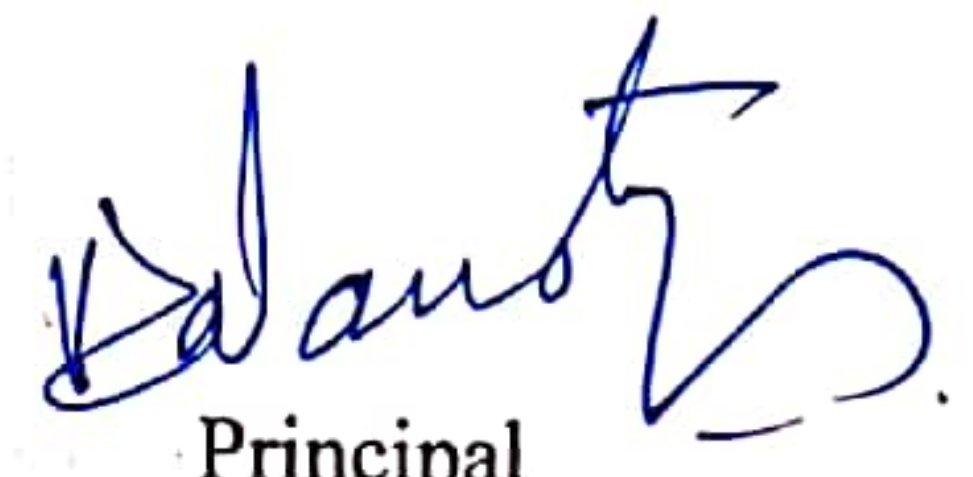
Respected Sir,

I am glad to inform you that following students of M.Sc. II Semester VI (Chemistry) of your Shri Shivaji College, Akola have successfully completed Nanotechnology Technique in Chemistry department of our Shri R. L. T. College of Science Akola college from 03 Feb. 2020 to 08 Feb. 2020. All the work done by the students was under the guidance of experts of the department.

The implementation of study will be for their project work. All the students were sincere in their work and good in learning new things. I wish all of them best luck for their future.

Name of Students

1. Ms. Vaishali Patil
2. Ms. Sameena Kausar
3. Ms. Priya Mankar
4. Ms. Kajal Panwani



Principal

Shri R. L. T. College of
Science, Akola



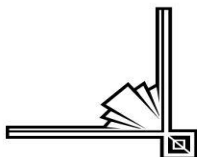
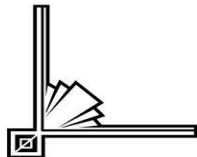
CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



JUNE TO AUGUST, 2020

SL. NO.: CSIR/SRTP/2020/NEIST/5852

NAME: Mr. Narayan Santosh Shitre





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE HAS THE FOLLOWING ACTIVITIES

Eminent Scientist Lectures, Special Sessions, Project specific classes, Elocution video, Poster designing, Essay writing, Assignments / Project works given by mentor/coordinator & Summer Research Project Completion Report

CANDIDATE'S NAME: Mr. Narayan Santosh Shitre SL. NO.: CSIR/SRTP/2020/NEIST/5852

GRADE: A

HOST INSTITUTE: CSIR-NEIST

MENTOR'S NAME: Dr. Rakesh S. Joshi

REMARKS

.....

MENTOR



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CERTIFICATE

Name: Mr. Narayan Santosh Shitre **SI. No.:** CSIR/SRTP/2020/NEIST/5852

has completed all the requirements of the CSIR-Summer Research Training Program (CSIR-SRTP) 2020 **online** during June to August, 2020 coordinated by CSIR-NEIST, Jorhat

DR. G. NARAHARI SASTRY
DIRECTOR
CSIR-NORTH EAST INSTITUTE OF
SCIENCE AND TECHNOLOGY

PROF. ALOK DHAWAN
DIRECTOR
CSIR-INDIAN INSTITUTE OF
TOXICOLOGY RESEARCH

DR. SHEKHAR C. MANDE
DIRECTOR GENERAL, CSIR
SECRETARY, DSIR, GOVT. OF INDIA





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



JUNE TO AUGUST, 2020

SL. NO.: CSIR/SRTP/2020/NEIST/1432

NAME: AAKANKSHA PRAMOD
PINJARKAR



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE HAS THE FOLLOWING ACTIVITIES

Eminent Scientist Lectures, Special Sessions, Project specific classes, Elocution video, Poster designing, Essay writing, Assignments / Project works given by mentor/coordinator & Summer Research Project Completion Report

CANDIDATE'S NAME: AAKANKSHA PRAMOD SL. NO.: CSIR/SRTP/2020/NEIST/1432

PINJARKAR

GRADE: A

HOST INSTITUTE: CSIR-NEIST

MENTOR'S NAME: DR. LAKSHI SAIKIA

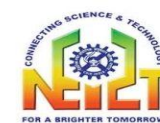
REMARKS

.....

MENTOR



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CERTIFICATE

Name: AAKANKSHA PRAMOD PINJARKAR **Sl. No.:** CSIR/SRTP/2020/NEIST/1432

has completed all the requirements of the CSIR-Summer Research Training Program (CSIR-SRTP) 2020 **online** during June to August, 2020 coordinated by CSIR-NEIST, Jorhat

DR. G. NARAHARI SASTRY
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PROF. ALOK DHAWAN
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DR. SHEKHAR C. MANDE
DIRECTOR GENERAL, CSIR
SECRETARY, DSIR, GOVT. OF INDIA





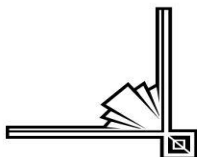
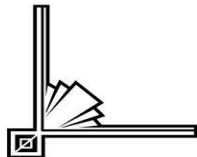
CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



JUNE TO AUGUST, 2020

SL. NO.: CSIR/SRTP/2020/NEIST/4226

NAME: Vanshika Dinesh Padiya





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE HAS THE FOLLOWING ACTIVITIES

Eminent Scientist Lectures, Special Sessions, Project specific classes, Elocution video, Poster designing, Essay writing, Assignments / Project works given by mentor/coordinator & Summer Research Project Completion Report

CANDIDATE'S NAME: Vanshika Dinesh Padiya SL. NO.: CSIR/SRTP/2020/NEIST/4226

GRADE: A

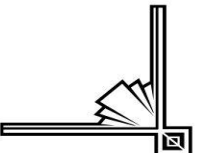
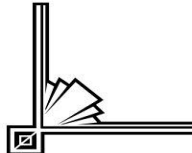
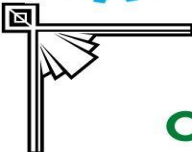
HOST INSTITUTE: CSIR-NEIST

MENTOR'S NAME: Dr Bipul Das

REMARKS

.....

MENTOR





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CERTIFICATE

Name: Vanshika Dinesh Padiya **SI. No.:** CSIR/SRTP/2020/NEIST/4226

has completed all the requirements of the CSIR-Summer Research Training Program (CSIR-SRTP) 2020 **online** during June to August, 2020 coordinated by CSIR-NEIST, Jorhat

DR. G. NARAHARI SASTRY
DIRECTOR
CSIR-NORTH EAST INSTITUTE OF
SCIENCE AND TECHNOLOGY

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DIRECTOR
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DR. SHEKHAR C. MANDE
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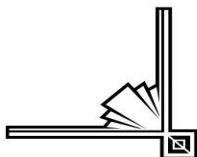
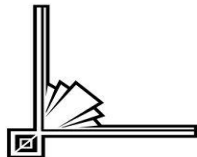
CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



JUNE TO AUGUST, 2020

SL. NO.: CSIR/SRTP/2020/NEIST/3501

NAME: PRACHI HOLKAR





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE HAS THE FOLLOWING ACTIVITIES

Eminent Scientist Lectures, Special Sessions, Project specific classes, Elocution video, Poster designing, Essay writing, Assignments / Project works given by mentor/coordinator & Summer Research Project Completion Report

CANDIDATE'S NAME: PRACHI HOLKAR SL. NO.: CSIR/SRTP/2020/NEIST/3501

GRADE: B

HOST INSTITUTE: CSIR-NEIST

MENTOR'S NAME: DR RAM AWATAR MAURYA

REMARKS

.....

MENTOR



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CERTIFICATE

Name: PRACHI HOLKAR **Sl. No.:** CSIR/SRTP/2020/NEIST/3501

has completed all the requirements of the CSIR-Summer Research Training Program (CSIR-SRTP) 2020 **online** during June to August, 2020 coordinated by CSIR-NEIST, Jorhat

DR. G. NARAHARI SASTRY
DIRECTOR
CSIR-NORTH EAST INSTITUTE OF
SCIENCE AND TECHNOLOGY

PROF. ALOK DHAWAN
DIRECTOR
CSIR-INDIAN INSTITUTE OF
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DR. SHEKHAR C. MANDE
DIRECTOR GENERAL, CSIR
SECRETARY, DSIR, GOVT. OF INDIA





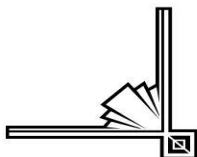
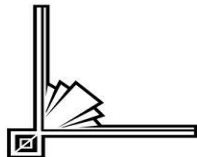
CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



JUNE TO AUGUST, 2020

SL. NO.: CSIR/SRTP/2020/NEIST/2338

NAME: PRIYANKA SANJAY GOTE





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE HAS THE FOLLOWING ACTIVITIES

Eminent Scientist Lectures, Special Sessions, Project specific classes, Elocution video, Poster designing, Essay writing, Assignments / Project works given by mentor/coordinator & Summer Research Project Completion Report

CANDIDATE'S NAME: PRIYANKA SANJAY GOTE SL. NO.: CSIR/SRTP/2020/NEIST/2338

GRADE: S

HOST INSTITUTE: CSIR-NEIST

MENTOR'S NAME: DR. RAM AWATAR MAURYA

REMARKS

.....

MENTOR



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CERTIFICATE

Name: PRIYANKA SANJAY GOTE **Sl. No.:** CSIR/SRTP/2020/NEIST/2338

has completed all the requirements of the CSIR-Summer Research Training Program (CSIR-SRTP) 2020 **online** during June to August, 2020 coordinated by CSIR-NEIST, Jorhat

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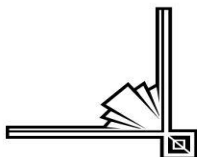
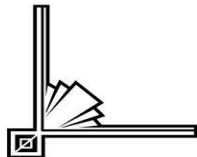
CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



JUNE TO AUGUST, 2020

SL. NO.: CSIR/SRTP/2020/NEIST/5933

NAME: Shradha Dongre





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020 ONLINE HAS THE FOLLOWING ACTIVITIES

Eminent Scientist Lectures, Special Sessions, Project specific classes, Elocution video, Poster designing, Essay writing, Assignments / Project works given by mentor/coordinator & Summer Research Project Completion Report

CANDIDATE'S NAME: Shraddha Dongre SL. NO.: CSIR/SRTP/2020/NEIST/5933

GRADE: A

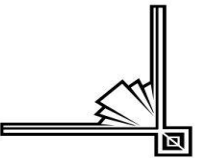
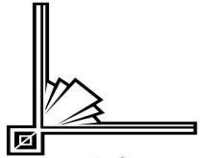
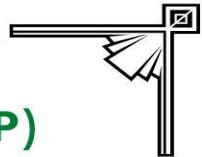
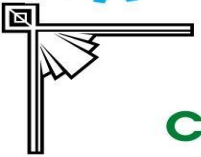
HOST INSTITUTE: CSIR-NEIST

MENTOR'S NAME: Prof. Hilloljyoti Singha

REMARKS

.....

MENTOR





CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP)2020 ONLINE



CERTIFICATE

Name: Shradha Dongre **SI. No.:** CSIR/SRTP/2020/NEIST/5933

has completed all the requirements of the CSIR-Summer Research Training Program (CSIR-SRTP) 2020 **online** during June to August, 2020 coordinated by CSIR-NEIST, Jorhat

DR. G. NARAHARI SASTRY
DIRECTOR
CSIR-NORTH EAST INSTITUTE OF
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PROF. ALOK DHAWAN
DIRECTOR
CSIR-INDIAN INSTITUTE OF
TOXICOLOGY RESEARCH

DR. SHEKHAR C. MANDE
DIRECTOR GENERAL, CSIR
SECRETARY, DSIR, GOVT. OF INDIA



One day workshop on Artificial Intelligence in Drug Discovery



Organized by
CSIR-North East Institute of Science & Technology



Sl. No. AIDD1976

Certificate of Participation

This is to certify that

SHRADDHA RAJU DONGRE

*has participated in the
one day workshop on “Artificial Intelligence in Drug Discovery” organized by
CSIR-North East Institute of Science and Technology, Jorhat on 01-09-2020.*

Debabrata Das

Mr. Debabrata Das
Coordinator
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
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
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
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
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Novel synthesis of some *N*-glycosyl benzimidazolyl thiocarbamides and their antimicrobial activity

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Manuscript received online 25 July 2015, accepted 09 August 2016

Abstract : Several 1-peracetyl and perbenzoyl glycosyl benzimidazolyl thiocarbamides were synthesized by the interaction of peracetyl and perbenzoyl glycosyl isothiocyanate and 2-amino benzimidazole. The identities of these newly synthesized compounds were established on the basis of usual chemical transformations and IR, ¹H NMR and Mass spectral studies. All the synthesized compounds have been evaluated for their antibacterial and antifungal activity against different bacteria and fungi by agar diffusion method.

Keywords : Glycosyl isothiocyanate, aminobenzimidazole, benzimidazolyl thiocarbamide, antimicrobial activity.

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Few interesting gigas mutants isolated from mutagenized m2 population of chickpea (Cultivar- Vijay)

AUTHOR(S)
Prajwal Bogawat, Shivdas Aher, Deepak Koche, Archana Joshi-Saha

ABSTRACT
Gigas mutants are phenotypically dominant mutant plants with vigorous vegetative growth over control. From mutagenized M2 population of chickpea (cultivar- Vijay) 04 gigas mutants were isolated. All the isolated gigas were with elongated, rigid stem, larger and broader leaflets and 02 with extensive hairs on leaf and stem surface. However, their flowering tendencies are found to be altogether different. Off these one was sterile, one showed normal flowering

Photoluminescence properties of $\text{KSrPO}_4:\text{Sm}^{3+}$ phosphor for SSL applications

Authors: R. G. Bora, C. B. Palan, N. S. Sawala, G. V. Korpe, S. K. Omanwar

Published in: *Journal of Materials Science: Materials in Electronics* | Issue 1/2018



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Abstract

The orange light emitting $\text{KSr}_{(1-x)}\text{PO}_4:\text{Sm}^{3+}$ ($x = 0.001, 0.002, 0.005, 0.01$ and 0.02) phosphors were successfully synthesized via solid-state diffusion method. The phase of the prepared $\text{KSrPO}_4:\text{Sm}^{3+}$ phosphor was confirmed by powder XRD analysis and studied its photoluminescence (PL) properties under ultraviolet

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AIP Conference Proceedings 1953, 030112 (2018); <https://doi.org/10.1063/1.5032447>

M. R. Belkherkar^{1,2,bl} and A. U. Utale^{2,al}

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ABSTRACT

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ABSTRACT

Nanocrystalline Fe doped and undoped Mn_3O_4 thin films have been deposited by Successive



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**SYNTHESIS, CHARACTERISATION, THERMAL AND ANTIMICROBIAL
STUDIES ON MANGANESE, COBALT, NICKEL, COPPER AND ZINC
COMPLEXES**

R.G Mahale¹, R.B.Mohod²

1. S.S.V.P.S^{NS}.L.K Dr.P.R.Ghogrey Science College Dhule. (Maharashtra).

2. Shri Shivaji Arts, commerce and Science College Akola. (Maharashtra).

ABSTRACT

Metal complexes of Mn(II), Fe(II), Co(II), Ni(II), Cu(II), and Zn(II) with Schiff base ligand derived from 2-hydroxy-5-chloroacetophenone and S-benzylthiocarbamate have been synthesized. Isolated complexes have been characterized by elemental analysis, IR, Reflectance Spectra, Magnetic measurement, thermal analysis and antimicrobial studies. The copper(II) complex behave a subnormal magnetic moment due to antiferromagnetic exchange interaction while normal magnetic moments at room temperature IR and H^1 -NMR spectral studies show that the Schiff base behave as a dibasic and tridentate ligand coordinated through the deprotonated phenolic oxygen, azomethine nitrogen and thioenol sulphur. The thermogravimetric data have been analyzed for kinetic parameters using Freeman-Carroll and Sharp-Wentworth method. The antibacterial activities of the ligand and its complexes have been also been screened against various organism.

Keywords: Metal complexes, TGA, Antimicrobial activity

AN OVERERVIEW OF MAJOR CLASSES OF PHYTOCHEMICALS: THEIR TYPES AND ROLE IN DISEASE PREVENTION

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Abstract The green belt of Mother Nature is the richest source of bioactive phytochemicals and natural nutraceuticals. Enormous work done during the past fifty years has shown that these phytochemicals play an important role in the routine healthcare systems worldwide. The major classes of phytochemicals like alkaloids, phenolics, terpenoids and tannins have potential to prevent diseases and act as anti-microbial, anti-inflammatory, anti-oxidant, anti-cancerous, detoxifying agent, immunity-potentiating agent and neuropharmacological agent. Each class of these functional agents consists of a wide range of chemicals with differing potency. Some of these phytochemicals are found to be multifunctional. There is, however, much scope for further systematic research in screening Indian medicinal plants for their phytochemicals and assessing their potentiality as crude drug or drug components.

Keywords phytochemicals, nutraceuticals, biological activities

Introduction

Phytochemicals are biologically active, naturally occurring chemical compounds found in plants, which provide health benefits for humans as medicinal ingredients and nutrients (HASLER & BLUMBERG, 1999). They protect plants from disease and damage, and also contribute to the plant's colour, aroma and flavour. In general, the plant chemicals that protect plants from environmental hazards such as pollution, stress, drought, UV exposure and

pathogenic attack are called as phytochemicals (GIBSON *et al.*, 1998; MATHAI, 2000). Recently, it has been clearly shown that they also have roles in the protection of human health, when their dietary intake is significant (SAMROT *et al.*, 2009; KOCHÉ *et al.*, 2010). Till date over 4,500 phytochemicals have been reported and are classified on the basis of their protective functions, and physical and chemical characteristics, amongst these about 350 phytochemicals

RESEARCH ARTICLE

Frequency and spectrum of chlorophyll mutants induced by gamma rays and EMS in two chickpea varieties (Variety- Vijay and PKV-2)

■ PRAJWAL BOGAWAR, DEEPAK KOCHÉ AND ARCHANA JOSHI-SAHA

SUMMARY

Chickpea is one of the most important leguminous food grain grown worldwide. Mutagenesis could be used as a classical way to increase genetic variability in chickpea considering its narrowing genetic base. Present study was an attempt to analyze the frequency and spectrum of chlorophyll mutations induced by gamma rays (300, 400 and 500 Grey) and ethyl methanesulphonate (0.2%, 0.3% and 0.4%) in M_2 generation of varieties of chickpea (Var- Vijay and PKV-2). Broad spectrum chlorophyll mutants were isolated from M_2 generation. The relative frequency of these mutants in both varieties was observed in order of Tigrina > Viridis > Chlorina > Xantha and Albina. The total chlorophyll mutation frequency increased with increase of dose upto certain limit and then started declining. However, the effectiveness of EMS was found to be more prominent than gamma rays especially in inducing chlorophyll mutations in Chickpea.

Key Words : Chickpea, Chlorophyll mutants, Ethyl methanesulphonate, Gamma rays, Frequency

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Chickpea (*Cicer arietinum* L.) is a good source of protein, carbohydrates, minerals and fibres (Jukanti *et al.*, 2012) and is being consumed for

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its nutrition worldwide, thus, having status of second largest leguminous crop cultivated in 13.2 Million hectare area with production of about 11.6 Million tones (FAO STAT, 2013). The average yield of chickpea reported so far is far below than its potential and conventional breeding does not offer any solution to increase its productivity (Choudhary *et al.*, 2013). Worldwide efforts are being made to improve the qualitative and quantitative traits of this crop. But its narrowing genetic base is reportedly the major cause of concern leading vulnerability of this crop to biotic and abiotic stresses (Sharma *et al.*, 2013 and Joshi-Saha and Reddy, 2014).



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RESEARCH ARTICLE

GENETIC VARIABILITY OF MORPHOLOGICAL MUTANTS INDUCED BY GAMMA RAYS AND EMS IN CHICKPEA (VARIETY-VIJAY AND PKV-2)

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ABSTRACT

Chickpea is an important grain legume cultivated worldwide. Both *desi* and *kabuli* biotypes are widely used as prime source of protein in many countries of the world. A narrow genetic base is one of the major bottlenecks in chickpea improvement programs. Induced mutations can be an effective way to introduce variability in the existing germplasm/cultivars for their effective utilization in the breeding programs. Genetic variability of morphological mutations induced by varying doses of physical (gamma rays) and chemical (EMS) mutagens in M₂ population was studied in one *desi* (Vijay) and one *kabuli* (PKV-2) varieties of chickpea. In M₂ population, 42 different types of morphological mutations in different parts of the plants, such as growth habit, branching pattern, stem structure, foliage type architecture and color, plant height, pod and seed size, flower color, flowering behavior and maturity was observed. Further the mutants were also grouped on the basis of variability observed in single, two or multiple traits. EMS was found to be more effective than gamma rays in induction of chlorophyll variations in both the cultivars. Overall lower doses of both mutagens were found to induce more variation as compare to higher doses. The mutations per 1000 M₂ progeny was recorded highest in 300 Gy gamma radiations and 0.2% EMS for variety Vijay and 150 Gy gamma radiations and 0.2% EMS in variety PKV-2. Both gamma rays and EMS were found to have significant mutagenic potential to induce morphological variations in Chickpea.

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INTRODUCTION

Chickpea (*Cicer arietinum* L.) is an important pulse crop widely cultivated and consumed at global level. It is a member of Fabaceae with diploid chromosome number $2n=2x=16$ and is highly self-pollinated with an outcrossing rate of less than 1% (Arumuganathan and Earle, 1991). It is an essential and cheap source of protein, carbohydrate and minerals in human diet especially in Indian subcontinent (Jukanti et al., 2012) and plays a key role in the enrichment of soil fertility by fixing atmospheric nitrogen through symbiotic nitrogen fixation. The average yield of chickpea reported in India so far is far below than its potential (Choudhary et al., 2013). Worldwide efforts are being made to improve the qualitative and quantitative traits of this crop. However, its narrowing genetic base is reportedly the major cause of concern for the breeding programs for chickpea improvement as well as for the crop production and productivity in the climate change scenario as a narrow genetic base also increase the vulnerability of this crop to various biotic and abiotic stresses (Sharma et al., 2013,

Joshi-Saha and Reddy, 2014). Induced mutation is a vital tool used for the improvement of crops through the introduction of mutations at different loci that regulates economically important traits and/or by removing undesirable genes from elite breeding lines (Lippert et al., 1964). Use of mutation breeding to create genetic variability in existing gene pool or to develop characters which are unavailable or lost from the existing gene pool is a very promising breeding activity. Mutation breeding has additional advantage when there is a case of improvement of a good variety which needs to alter just one or two traits (Joshua, 2000). Genetic variability for desirable traits can be effectively induced through mutations and its practical significance in plant improvement programmes has been well recognized (Gaur and Gour, 1999; Atta et al., 2003; Nayyar et al., 2005; Ganapathy et al., 2008; Joshi Saha et al., 2015). Induced morphological mutants are used as markers in genetics, physical and biochemical investigations of gene action of mutagenic factors (Gaul, 1964). The frequency and spectrum of chlorophyll mutants are being used as the primary index to test effectiveness of mutagens and mutability of genotype which in turn would be useful to generate the wide array of useful mutants in treated population. Mutagens have been used to induce useful phenotypic variations in crop plants.

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Diversity and economic importance of tree species in Narnala wildlife sanctuary (MS)

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Abstract

Narnala wildlife sanctuary encompasses a small part of southern region of Melghat tiger reserve, Amravati Division (MS). This area has rich floral and faunal diversity. Present study is focused on the floral diversity of Narnala wildlife sanctuary with special reference to tree species. This area has typical deciduous tree species with wide range of taxonomic diversity. Altogether 64 tree species from 30 plant families are identified taxonomically, and enumerated in present article. Members of Mimosaceae and Fabaceae were found as most common plant in this region. The tribal inhabitants of foothill were observed to use these plants and plant products for their livelihood as food, fodder, timber, medicine etc.

Keywords: Narnala Wildlife sanctuary, deciduous, taxonomic diversity, tribals

1. Introduction

Indian subcontinent is recognized for its subtropical species diversity. Since ancient ages, this treasure is being utilized by man for its livelihood and other benefits. However, since the commence of industrialization era, anthropogenic activities increases that leads the mass destruction of natural forests. The exploitation of forest plants and plant products also increased during last five decades. These anthropogenic activities results in extinction of many important taxa from natural vegetation. Therefore there is urgent need of careful management interventions to maintain overall biodiversity and sustainability^[1]. Accurate assessment and understanding of the dynamics of plant resources is important for their sustainable management, utilization and biodiversity conservation.

Information with reference to species diversity and distribution pattern may help in evaluating the ecological significance of the study area. Trees occupy the important place in natural vegetation. Trees have always been associated with human wisdom and immortality in India. Trees are important component of the natural forests as they help to prevent soil erosion and make provision of a weather-sheltered ecosystem in and under their foliage. They also play an important role in producing oxygen and reducing carbon dioxide in the atmosphere, as well as moderating ground temperatures. In many developing countries, trees are being used as fuel form and timber material for making houses and household furniture. Several trees possesses mythological, ancient Ayurvedic medicinal significance. Some of three produces resins and gums. Thus, tree also are economically beneficial to mankind.

Narnala Sanctuary is situated in Akot Tehsil of Akola district (Maharashtra state) covering the Satpuda mountain ranges. The total area of the Sanctuary is 12.35 Sq.km. The study area is lies between 23°28 N latitude and 73°18 E longitude. The area is traversed by river, which passes

through middle of the sanctuary. It is a part of Project Tiger Melghat having total area of 2027.29 Sq. Km area. This area is dominated by tribal communities like Gond, Rajgond, Korku, Gawali and Pradhan^[2]. These tribals use the plant wealth of this sanctuary for their livelihood. The present study was conducted during 2014-2015. The study is focused on exploration of tree species from this area and also noted their economic uses as per the tribal communities of this area.

2. Materials and Methods

Several surveys were conducted locate different plant species in different patches of study area during 2014-2015. During the survey each plant was photographed in its natural habitat. The specimens were collected and identified using floras^[3, 4, 5]. Later, each herbarium specimen was deposited in Department of Botany, Shri Shivaji College, Akola (MS). After correct taxonomic identification, each plant was assigned to its respective family and enumerated alphabetically. During collection period, the nearby baseline area of sanctuary which is dominated by tribal inhabitant was interrogated and economic uses of the plants collected was noted.

3. Results and Discussion

The observations of tree diversity in Narnala wildlife sanctuary (MS) are presented in the table-1. The plants are given here alphabetically with their respective families, local names and folk use as per the tribal residents of this area. All tree species reported from the study are deciduous and represent typical subtropical characters. Among the reported tree species, the members of Mimosaceae and Fabaceae were dominant, followed by Rubiaceae, Combrataceae and Moraceae members (Table-1). Most of the tree plants of this area are being used by local tribals as fuel, timber, medicinal components, fruits for raw eating, gum and resins.

MEDICINALLY IMPORTANT WILD EDIBLE PLANTS OF EASTERN VIDARBHA

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Abstract: Explosion of population resulted into an inadequate availability of food resources such as cereals, pulses, vegetables and fruits to the individual. Documentation and spreading awareness of utilization of wild edible plants in the regular family diet may be a solution to overcome this alarming problem. Gondia has a land area of about 1.83% of Maharashtra state having 88% of population residing in rural region. Wild edible plant species are to be considered as main food resource for tribal and rural population residing at forest area. They use fruits, leaves, flowers, and roots of numerous plants. A survey was conducted in the rural region of Gondia district to document such plants. We found more than 25 wild plants to be in use either as vegetable or as staple food. We found plants of Fabaceae family like *Medicago sativa*, *Cassia tora*, *Smithia sp.* with some other family like Malvaceae, Lamiaceae and Marsileaceae. Plant parts like roots of *Clerodendron serratum* and *Chlorophytum borivilianum*, flowers of *Portulaca oleracea*, *Wrightia tinctoria*, *Smithia sp.* and *Celosia argentea* are used as food. Many of these plants are used for dual purpose like nutrition as well as for the treatment of various disease and disorders.

Keywords: Wild edible plants, medicinal uses, Gondia.

Introduction

The health and food of increasing population, which is projected to reach over 9 billion by 2050 (UN 2008), are some of the basic areas of concern especially in developing countries. Hunger, malnutrition, diseases and rural poverty are the outcome of above mentioned concerns facing previously disadvantaged population in India. One of the major causes of malnutrition is vitamin and micronutrient deficiencies, a phenomenon described as hidden hunger (TISDALE *et al.*, 1990).

Though plants have been used as a source of food, fodder, shelter, clothing, medicine and a verity of useful commodities from ancient time, the value of wild edible plants in food security has not been given sufficient attention in India (REDDY *et al.*, 2007).

Wild edible plants are the precious gift of our nature and most of the ethnic communities strongly depend on it for their day to day life. Wild vegetables are available locally and therefore inexpensive for low income sectors

SHORT COMMUNICATION

A Report on Gamma Radiation-Induced Variation in Seed Characters of *Cicer arietinum* L.

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Abstract

Cicer arietinum L. (chickpea) is one of most popular and cheap source of plant protein and minerals worldwide. The present study was directed to induce variations in seed characters of chickpea "Vijay", especially with reference to increase in its protein and mineral content using gamma radiations as mutagenic agent. M_2 population of *Cicer arietinum* L. "Vijay" after post-harvest analysis revealed that 300 Gy dose of gamma radiations induced significant variations in seed characters including seed size, surface texture and seed coat color. Total nine mutants were identified differing from control in seed coat colors and categorized into four groups on the basis of seed size as normal, small, bold and extra bold; two groups on the basis of surface texture and wrinkled or smooth surface. The seed yield of all mutants was noted as 100-seed weight, which was corresponding with seed size. The biochemical analysis of the seed mutants in the form of protein, iron and zinc content indicates that, seeds with dark colored seed coat have higher level of protein and minerals as compare to control.

Keywords: *Cicer arietinum*, gamma radiation, post-harvest, seed coat color, biochemical analysis.

Introduction

Cicer arietinum L. (chickpea) is the second largest pulse crop in the world. It is one of most popular and cheap source of plant protein and minerals like iron and zinc. Apart from this, chickpea plants have some medicinal properties; especially, seeds with dark seed coat are reported to have more medicinal potential than normal light color (Balasundaram et al., 2006). On the other hand, the chickpea grains have significant level of phytic acid, which usually inhibit

the actual available content of proteins and minerals at consumers end.

Genetic diversity is an important resource of genes for breeding programs for new quality products. Genetic diversity in 25 chickpea genotypes have been reported (Sharifi et al., 2018). Genetic bottlenecks and subsequent founder effects during domestication resulted in narrow genetic base, especially in crops like chickpea (Abbo et al., 2003). Chickpea variety "Vijay" is one of the most preferred varieties by the farmers of Maharashtra state for its resistance to bacterial wilt and comparatively high yield (Mandhare et al., 2011). The present study was directed to induce variations in seed characters of chickpea "Vijay", especially with reference to increase in its protein and mineral content using gamma radiations as mutagenic agent.

Materials and Methods

Germplasm of *Cicer arietinum* (L.) "Vijay" was procured from Pulse Research Center, Mahatma Phule Krishi Vidyapith Rahuri (MS). The seed material was first screened for any damage and seeds with about 10 to 12% moisture content were treated by gamma radiation doses (300 Gy, 400 Gy and 500 Gy) using Cobalt 60 as source. The irradiation was conducted at Bhabha Atomic Research Center (BARC) Mumbai (MS). Two hundred irradiated seeds per dose were sown in the field to rise M_1 population (October 2015). The M_1 progeny was harvested as individual plants. These seeds then sown on plant to row basis to generate M_2 progeny (October 2016). The M_2 population was monitored closely for morphological and economical traits (Khan et al., 2005) and then harvested. After harvest and threshing, plant having seeds with variation in seed coats color, seed surface texture, and seed size were identified and kept



SYNTHESIS AND STUDY OF SOME TRANSITION METAL COMPLEXES OF SCHIFF BASE LIGAND

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ABSTRACT

Schiff base ligand HMBPEA was prepared by the condensation of 2-hydroxy-5-methylbenzophenone with 2-phenylethylamine. A series of metal complexes of Mn(II), Co(II), Ni(II), Cu(II), Zn(II) and Cd(II) was synthesized with new Schiff base ligand by reaction with metal acetates in suitable solvent medium. The Schiff base ligand was characterized by elemental analysis, FT-IR and ¹H NMR spectra and the metal complexes have been characterized by elemental analysis, FT-IR, magnetic measurements and electronic spectra and thermal analysis techniques. The metal complexes were found to have different geometries octahedral, tetrahedral and square planar.

Keywords: Schiff base ligand, Infrared, Diffuse reflectance, Magnetic studies, TGA

1. Introduction

Schiff bases are the compounds containing azomethine (-CH=N-) group [1] usually formed by the condensation of carbonyl compounds with primary amines. In the synthesis of various bioactive products the Schiff bases are very important materials [2]. Schiff bases show various significant photochromic and catalytic properties [3]. Schiff bases are reported to have various antibacterial, antifungal, herbicidal and clinical activities [4, 5]. Schiff bases form a very important class of organic compounds [6] popularly used as a ligand for the synthesis of coordination compounds of transition, inner transition and main group elements. Schiff base metal complexes also showed some degree of antibacterial, antifungal, antitumor and anti-inflammatory activity [7]. Many Schiff base

metal complexes have been reported to show catalytic activities in various redox reactions of biological and environmental importance [8].

Transition metals generally form stable complexes with Schiff base ligands. In last few decades transition metal complexes of Schiff base ligands containing donor atoms (like N, O etc.) have been synthesized and extensively investigated for their various synthetic, biological and medicinal applications [9]. The benzophenone derivatives have various biological and physicochemical properties, therefore various benzophenone based Schiff base ligands and their transition metal complexes have been synthesized, characterized and extensively studied for their biological and medicinal applications [10]. Some Schiff base metal complexes have been found to show antitumor activity. Such complexes were synthesized and evaluated for their DNA binding abilities [11, 12]. Nowadays, the Schiff base coordination chemistry research has been expanded enormously in the field of biomedical applications, supramolecular chemistry, bioinorganic chemistry, separation processes, catalysis and material sciences. The formation of compounds of unusual structure and properties has been well recognized [13].

In this extent, a new Schiff base was synthesized from 2-hydroxy-5-methylbenzophenone with 2-phenylethylamine and its transition metal complexes were prepared and characterized by various physicochemical and spectroscopic techniques to suggest the stereochemistry.

2. Experimental

All the chemicals used for synthesis were of AR grade. The solvents required were used after distillation if necessary. The metal acetates of



SYNTHESIS, CHARACTERIZATION AND BACTERIAL ASSAY OF 4-PHENYL-5-ARYLIMINO-3-S-TETRA-O-ACETYL GLUCOSYL-1,2,4 DITHIAZOLIDINES

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Abstract:

Chemistry of *S*-Chloro-*N*-phenyl isothiocarbamoyl chloride with special utility in the synthesis of nitrogen and sulfur containing heterocyclic compounds has been exhaustively investigated by number of chemists. In recent years, there has been increasing interest in the synthesis of heterocyclic compounds by cyclization of appropriate linear compounds. In view of applications of these compounds in various fields, the current study was related to investigate the following reactions. 4-phenyl-5-arylimino-3-*S*-tetra-*O*-acetyl glucosyl-1, 2, 4- dithiazolidines have been synthesized by the interaction of *S*-tetra-*O*-acetyl Glucosyl-1-phenyl-isodithiocarbamate with various *N*-aryl-*S*-chloro isothiocarbamoyl chlorides. The identities of these new compounds have been established on the basis of chemical transformation and spectral studies. In the present investigation the *In-vitro* bacterial assay of compounds has been evaluated by using several bacteria such as *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa*. All compounds studied shows satisfactory bacterial assay.

Key words: 1, 2, 4- dithiazolidines, Isodithiocarbamate, *N*-aryl-*S*-chloro isothiocarbamoyl chlorides, bacterial assay.

Introduction:

Heterocyclic compounds and medicines are interconnected in the recent era. 1, 3, 5-thiadiazines and their derivatives have been shown to possess brightening and fibre finishing properties in textile industries. Thiadiazines have exhibited remarkable pharmacological activities such as spasmolytic, anaesthetic,

cardiovascular and hypo metabolic agents. They are also used as fungicidal, insecticidal and as medicinal compounds. Heterocyclic compounds are found to exhibit anti-inflammatory, anti-parasitic, anti-tubercular, antidiabetic activity¹⁻³.

Organosulfur compounds play an important role in modern organic synthesis. In laboratory there are various reports on sugar heterocyclic possessing antimicrobial and antifungal activities⁴⁻¹⁰. In view of applications of these compounds in various fields, the current study was related to investigate the following reactions. 4-phenyl-5-arylimino-3-*S*-tetra-*O*-acetyl glucosyl-1, 2, 4- dithiazolidines 3(a-f) have been synthesized by the interaction of *S*-tetra-*O*-acetyl Glucosyl-1-phenyl-isodithiocarbamate 1 with various *N*-aryl-*S*-chloro isothiocarbamoyl chlorides 2(a-f).

Results and Discussion:-

N- phenyl-*S*-chloro isothiocarbamoyl chloride 2a (0.005 M, 1.025 gm) in 10 ml chloroform was added gradually to cold solution of *S*-tetra-*O*-acetyl- α -D-glucosyl-1-phenyl-isodithiocarbamate 1 (0.005M, 2.49gm) in 25 ml chloroform. The reaction was quite brisk and exothermic with the evolution of hydrogen chloride. The mixture was refluxed for 3 hr. The chloroform was distilled off. The resultant solution was allowed to stand for several hours but no solid was separated out. The sticky mass thus obtained was triturated several times with petroleum ether (60-80°C). It furnished a granular solid. It was purified from ethanol-water.

The IR, ¹H NMR and mass spectral analysis (Experimental) and elemental analysis (Table 1) clearly indicated the product and assign the structure as 4-phenyl-5-phenylimino-

An alternative synthesis of the CNS stimulant Prolintane

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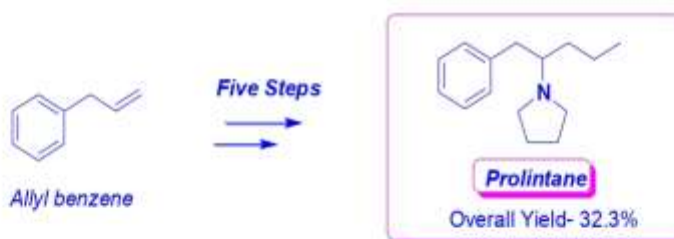
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Abstract

An alternative synthesis of prolintane, a CNS stimulant, is reported using commercially available allylbenzene in good overall yield (32.3%). The key transformations include epoxidation, Grignard reaction, Mitsunobu and reduction protocols.



Keywords: Prolintane, epoxide, CNS stimulant, Mitsunobu reaction

An efficient and cost effective synthesis of acetamides catalyzed by calcium chloride

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CaCl₂ has been found to be an efficient and cost effective catalyst for the rapid synthesis of acetamides in high yields. The use of stoichiometric quantities of acetic anhydride under solvent free conditions without any additional chromatographic purifications makes this protocol a safe alternative to the existing methods.

Keywords: Acetamide, acylation, acetylation, amine, CaCl₂

Protection and deprotection techniques are the frequently encountered exercise for the synthesis of complex organic materials. Hence, the protection of various functional groups *via* environmentally benign procedures is highly desirable. Amine functionality is one of the most important functional group present in plethora of biologically relevant molecules. Many protective groups are available for the protection of amine functionality. Out of these acetyl group is the most common, as it is stable in acidic conditions and can be removed easily under alkaline conditions¹. Different reagents used for the acetyl protection of amines are acetic anhydride², acetyl chloride³, acetyl acetone⁴, acetic acid⁵, zinc acetate⁶ and thioacid⁷. Among these, acetic anhydride is the most commonly used reagent as it is cheap, easy to handle and readily available. Besides their use as a protecting group, acetamides are present in various important natural products and pharmaceuticals such as paracetamol, zonisamide, lacosamide, *etc.* that are required in bulk quantities. Various methods are available for the acetamide synthesis under basic as well as acidic conditions using acetic anhydride⁸.

However, most of the methods suffer from one or more drawbacks such as harsh conditions, expensive reagents and catalysts, elevated temperatures, long reaction times and high toxicity. Very recently, Kim *et al.*⁹ reported the synthesis of acetamides using sulfated choline ionic liquid as a catalyst using grindstone method, though this method is quite

efficient in terms of yield and reaction times, however the catalyst is not commercially available, and require preparation. To overcome these drawbacks still there is an avenue to develop a new catalyst system that can minimize these limitations. Therefore, efficient catalysts that are environmentally friendly, more economical and use stoichiometric amount of reagent in absence of volatile organic solvents (VOSs) are desirable. Calcium chloride (CaCl₂) is a readily available, inexpensive reagent used for dehydration and recently gaining momentum as a green catalyst in various organic transformations. To exemplify, CaCl₂ has been used in Mannich reaction¹⁰, Kabachnik-Fields three component reaction¹¹ Biginelli and aldol transformations^{12,13}. Recently, it has been utilized as an efficient Lewis acid catalyst for the synthesis of 9-aryl-1,8-dioxooctahydroxanthene¹⁴.

Results and Discussion

These findings motivated us to extend the utility of CaCl₂ in facile organic transformations, herein we report for the first time an efficient, environmentally benign, low cost and clean protocol for acetamide synthesis using CaCl₂. Initially, we carried out the reaction with equimolar quantities of aniline and acetic anhydride in presence of 10 mol% CaCl₂ using acetonitrile as a solvent and to our delight, the reaction was completed in 20 min with 94% yield (Scheme I). Next, we evaluated different solvents like acetone, chloroform and they



SILICA-BORIC ACID ($\text{SiO}_2\text{-H}_3\text{BO}_3$): A MILD, EFFICIENT AND REUSABLE HETEROGENEOUS CATALYST FOR BOC PROTECTION OF AMINES

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ABSTRACT

An efficient method for *N*-tert-butoxy carbonylation of amines using silica-boric acid ($\text{SiO}_2\text{-H}_3\text{BO}_3$) as a new catalyst is described. The catalyst is air stable and can be readily separated from the reaction products and recovered for direct reuse.

Keywords: Silica-Boric Acid Catalyst, Protection of amines

1. Introduction

Protection and deprotection plays a pivotal role for the synthesis of complex organic molecules. Amine is one of the most important functional group present in plethora of biologically active compounds. So, its protection plays a crucial role while designing the syntheses of bioactive molecules. Till now, many protective groups have been developed for the amine functionality. Out of these, *N*-tert-butyloxycarbonyl (Boc) has emerged as the most commonly used strategies due to the ease of protection as well as deprotection. This group is stable for various base-catalyzed nucleophilic substitutions and catalytic hydrogenation reactions.¹ Various methods are available for the *N*-tert-butyloxycarbonylation (Boc) under basic as well as Lewis acidic conditions using di-*tert*-butyl-dicarbonate (Boc_2O) that includes I_2 ,² ZrCl_4 ,³ $\text{HClO}_4\text{-SiO}_2$,⁴ $\text{Zn}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$,⁵ ionic liquid,⁶ Amberlyst-15,⁷ sulfamic acid,⁸ etc. However, most of the methods suffer from one or more drawbacks like highly basic conditions, elevated temperatures, long reaction times and high toxicity. To overcome these drawbacks still there is a need to develop a new catalyst system that can minimise these limitations. Recently, solid supported catalysts have attracted great deal of attention for

carrying out important organic transformations. Supported reagents have good thermal and mechanical stabilities. These are more advantageous over homogeneous catalysts as they can be easily recovered from reaction mixture by simple filtration and can be reused several times, making the process more economically and environmentally viable.^{9,10}

One of the few solid supported catalysts is silica supported boric acid ($\text{SiO}_2\text{-H}_3\text{BO}_3$) as it is a simple, inexpensive reagent recently gaining momentum as a green catalyst in various organic transformations. It possesses environmentally benign properties such as non-toxicity, biocompatibility, recyclability, inexpensive and thermal stability. As an example, Parveen¹¹ *et al* utilized $\text{SiO}_2\text{-H}_3\text{BO}_3$ as an efficient solid supported recyclable catalyst for the synthesis of tetrazoles in high yields. Next, this elegant catalyst have been successfully utilized for the synthesis of bis(indolyl)methane derivatives,¹² β -amino carbonyl compounds,¹³ etc.

Encouraged by these advantages, we herein report for the first time use of silica-boric acid ($\text{SiO}_2\text{-H}_3\text{BO}_3$) for *N*-Boc protection of amines. $\text{SiO}_2\text{-H}_3\text{BO}_3$ catalyst was prepared using standard procedure¹⁴ and the structure was confirmed using IR spectroscopy.

2. Experimental

Preparation of silica supported boric acid: Boric acid (3.0 g) was taken in a 250 ml round bottom flask with 60 mL water and heated to 60-80°C. Silica gel (60-120 mesh, 27.0 g) was added gradually with constant stirring and refluxed for 5 hrs. Water was evaporated under reduced pressure and the residue was stirred at 100°C for 6-7 hrs under vacuum to give free

A report on identification of a unique hygrine like compound from chloroform extract of *Anisochilus carnosus* (L.f.) Wall

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General Note

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ABSTRACT

Anisochilus carnosus (Lamiaceae) is annual herb with traditional medicinal properties as antiulcer, expectorant, stimulant and antihypertensive agent. It is rich in phytochemical composition especially phenolic compounds. Here, a new compound was predicted from the spectral studies of chloroform leaf extract of the plant. After analysis of preliminary phytochemical composition, the IR, NMR and MS analysis was done. From the spectral data of IR, NMR spectra and Mass analysis of the extract showed C-N-, C=O- stretching; five membered ring structure (δ 7.5-8.1 ppm) and molecular ion peak at 141.31. From this, it was interpreted that the compound is unique and revealed almost similar spectral properties to that of hygrine, a pyrrolidine alkaloid, which was not reported earlier from any member of family lamiaceae.

Keywords: *Anisochilus carnosus*, Phytochemical composition, Spectral properties, Hygrine.

1. INTRODUCTION

Anisochilus carnosus (L.f.) Wall, is an annual, erect herb of Lamiaceae, commonly called as Kapuri, a common inhabitant of higher altitudes among small rocks (Ayyanar et al., 2005 and Imran, 2013). The plant is used traditionally to cure cough, fever, eczema, stomachache, hepatitis and inflammation (Arinathan et al., 2003; Ganeshan et al., 2004; Ignacimuthu et al., 2006 and Kambale et al.,

Novel Molten Salts Synthesis and Photoluminescence Properties of Eu (III) Doped Y_2O_3 Phosphor

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ABSTRACT

A novel molten salt method used for the synthesis of Eu^{3+} doped yttriumbased phosphor. It is well known that $Y_2O_3:Eu^{3+}$ is highly efficient red phosphors used for Lamp phosphor. The $Y_2O_3:Eu^{3+}$ phosphor was synthesized by reactions in molten salts method. The red emitting phosphor characterized through powder X-ray diffraction (XRD), and PL spectra. A novel molten salt is one step method and decrease calcining temperature.

Keywords : $Y_2O_3:Eu^{3+}$, Molten salts method, PL spectra.

I. INTRODUCTION

The production of reliable and reproducible ceramic materials for high technology applications require strict control over their powder characteristics, which includes chemical homogeneity, low impurity levels, small particle size, narrow size distribution and freedom from agglomeration. A variety of methods e.g. sol-gel, chemical precipitation of precursors in aqueous or organic solutions, thermal decomposition of solutions by spraying technique, high alkaline and hydrothermal precipitation have been proposed for obtaining small, uniform un-agglomerated powders. These methods so-called wet chemical method, have been found to be successful for number of systems. Also self-sustaining combustion synthesis is a simple, inexpensive and quick way of synthesizing various oxide materials in comparison to the wet chemical techniques [1].

Compounds containing rare earths have long been used as phosphors and laser materials because of their sharp, intensely luminescent f-f electronic transitions. In particular, Eu^{3+} has five narrow emission bands corresponding to the ${}^5D_0 \rightarrow {}^7F_j$ transitions where, $j = 0, 1, 2, 3, 4$. The strongest transition, ${}^5D_0 \rightarrow {}^7F_2$ occurs at 613 nm, which is a characteristic of red fluorescence of Eu^{3+} . This transition has also been shown to exhibit laser emission under appropriate conditions in Eu^{3+} doped crystals [2, 3]. It is well known that the $Y_2O_3:Eu^{3+}$ is highly efficient red phosphor and has its own importance in scintillation, lamp and color TV picture tubes [4].

The preparation of these red emitting phosphors is critical and requires special methods such as wet chemical methods. Recently preparation of Eu^{3+} doped yttria was carried out by the alkoxide route and combustion process [5, 6]. Though these processes are efficient, requires expensive chemicals and special



Nutritional profiling of wild areal tubers of *Dioscorea bulbifera* L. from Maharashtra, India

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Abstract

Dioscorea bulbifera is a wild twiner from family Dioscoreaceae with edible areal tubers. The forest dwellers and tribals were found to use these tubers as food during food crises, especially in Asian and African countries. Present study is an attempt to analyze nutritional profile (the physico-chemical, proximate content, amino acid profile, mineral and vitamin content) and phytochemicals in the edible areal tubers of *D. bulbifera* collected from three different forest areas of Maharashtra (India). It was found that, the tubers contains significant amount of proximate content, minerals and vitamins with good amino acid profile, but also noted to have some anti-nutrient factors like phytic acid. Hence, it is suggested that aerial tubers of this plant could be effectively use as supplementary food material during food scarcity.

Keywords: amino acids, *Dioscorea bulbifera*, minerals, proximate content, vitamins

Introduction

Dioscorea bulbifera is a wild edible tuber plant species from family Dioscoreaceae (Yam family). The genus *Dioscorea* comprises over 600 species worldwide (Amanze *et al.*, 2011) [1] and reported as native of South Africa. The areal as well as underground tubers of most of the species were found to be utilized by the local and tribal communities across the world as a source of food especially in food crises. Out of these, 10 species of *Dioscorea* were reportedly cultivated, mostly in African countries like Nigeria and Ghana (Obidiegwu, *et al.*, 2020) [33].

About 26 species of *Dioscorea* were reported from Indian subcontinent (Kumar *et al.*, 2012) [27]. Major *Dioscorea* species includes *D. alata*, *D. belophylla*, *D. bulbifera*, *D. esculenta*, *D. hispida*, *D. pentaphylla*, *D. wallichii* and *D. spinosa*. Off these, *D. bulbifera* is the most common species in Central India including Maharashtra.

The tubers of *D. bulbifera* were used by different tribal communities for intestinal colic problem, relieving dysmenorrhoea, reducing acidity, against rheumatoid arthritis, to relieve intense inflammation, in spasmodic asthma, for menopausal problems, for labor pain and the prevention of early miscarriage and to check diarrhoea (Nayak *et al.*, 2004; Bhogaonkar and Kadam, 2006; Mehta and Bhatt, 2007; Kamble *et al.*, 2010; Jadhav *et al.*, 2011 and Datta, 2015) [31, 5, 29, 23, 18, 10]. Apart from this the most important is nearly all local and tribal communities use the areal tubers as source of nutrition, especially in food crises and as nutritional aid to regular diet. These tubers are also found in the local India markets for sale during early summer season.

The present study is focused on nutritional profiling of *D. bulbifera* aerial tubers collected from three different forest ranges from Maharashtra India. It include physico-chemical, proximate analysis, mineral and vitamin analysis and phytochemical study to identify major medicinally important as well as anti-nutrient factors present in the tubers of *D. bulbifera*.

Material and Methods

Collection of tubers and Preparation of samples

The tubers of *Dioscorea bulbifera* were collected from three different forests zones of Maharashtra, India i.e. Katepurna Wildlife Sanctuary, District Akola (Sample- A), Nagzira Wildlife Sanctuary, District Gondia (Sample- B) and Tadoba Wildlife Sanctuary, District Chandrapur (Sample- C) during February 2017. The plants were identified using flora of Marathwada (Naik, 1998) [30] and flora of Maharashtra (Singh and Karthikeyan, 2000) [44]. Medium sized tubers were selected for experimentation. About 15 tubers were collected from each selected forest range for study. Each tuber is washed thoroughly, cleaned, peeled and cut into thin slices. These slices were oven dried (at 60°C for 48 Hrs) and packed into airtight polybags until use. Before analysis, the dried slices were ground into fine powder, that was sieved through mesh of 200 μ m and dried further at 100°C until achieve constant weight.

Physico-chemical and Proximate analysis

The moisture content of tuber and ash value were determined using standard protocols (AOAC, 1990) [3]. For crude protein content, the samples were digested using Kjeldahl and nitrogen content was detected by the method of Devani (1989) [8] and then the crude protein was calculated by multiplying the nitrogen content by conversion factor 6.25. The carbohydrate content was determined by anthrone method (Sadasivam and Manikam, 2005) [37]. Other proximate contents were determined by using protocols and guidelines of AOAC (1990) [3].

Amino acid profiling

The extraction of the samples to analyze amino acid content was done as per AOAC (2010) [2]. 5g sample was taken in 250 mL flask and defatted by extracting the fat content of the sample with 30 mL of petroleum ether. The sample was hydrolyzed, evaporated and then loaded into biochemical amino acid analyzer (Sykam S430).



Inheritance of a unique sterile mutant with non-fabaceous yellow flowers and miniature fern like foliage in Chickpea (*Cicer arietinum* L.)

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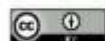
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General Note



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ABSTRACT

As a physical mutagen, gamma radiations play a vital role in crop improvement. However, mutagenesis is a non-targeted induction of variations in genomes and it could lead to unique mutant phenotypes that can form an important repository for basic science on plant growth and development. The present study reports chickpea (*Cicer arietinum* L.) mutants with fern like miniature foliage and sterile non-fabaceous yellow flowers isolated from M₂ population. Their sister progenies were harvested as single plants and grown as plant to row M₃ progenies to observe the inheritance pattern. In resulting progenies, the ratio of normal plant types to mutant

Correlating medicarpin content of chickpea cultivars as a key defense compound against *Fusarium* wilt

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ABSTRACT

Fusarium wilt is one of the most important diseases on chickpea crop grown in Indian subcontinent, leading huge damage in crop productivity. A study was conducted during 2016 to 2019 at the field of Shri Shivaji College of Arts, Commerce and Science, Akola, Maharashtra, India to investigate the wilt resistance and role of phytoalexin medicarpin as a defense compound in the different cultivars of chickpea. Four Chickpea cultivars (Digvijay, Vijay, Jaki and JG-62) were analyzed *in vivo* and *in vitro* for natural and induced level of antimicrobial compound *i.e.*, phytoalexin medicarpin in their leaves to confirm their resistance status against fusarium wilt. It was observed that, medicarpin content in leaves of naturally grown chickpea cultivars increases gradually from 10th day after germination. However, the initial content and rate of increase differ in all four cultivars. In leaves of cultivar Digvijay and Vijay it was found to increase till fruiting stage and maturity with disease incidence of 7 and 12%, respectively. In cultivars Jaki and JG-62, it starts declining from flowering onwards with disease incidence of 34 and 38% respectively. The *in vitro* studies showed that, the medicarpin content in cotyledons and seedlings elicited with fusarium cell wall elicitor (FCWE) was highest on fourth day of elicitation but the content was significantly lesser in Jaki and JG-62 as compare to Digvijay and Vijay. This indicates that, medicarpin is an essential compound in chickpea which play vital role in defending fusarium wilt either solely or in synergistic action with other defense related compounds.

Key words : Chickpea, *Fusarium*, medicarpin, resistance, wilt

INTRODUCTION

The low molecular weight antimicrobial compounds that accumulate in plants as a result of infection or stress are known as phytoalexins. The rapidity of their accumulation is associated with resistance in plants to disease caused by pathogen (Anil *et al.*, 2014). These are inducible secondary metabolites possessing antimicrobial activity toward phytopathogens (Douglas, 2017). The phytoalexins either solely or in combination with other defense compounds could decide resistance of cultivars against specific pathogen or stress. Medicarpin is an isoflavonoid compound, reported for the first time by Barz and Welle (1992) in Chickpea upon infection with *Ascochyta reibei*. Similar reports were made by several other workers in different plant species (Franzener *et al.*, 2018; Butt *et al.*, 2020).

Phytoalexins are restricted to compounds produced from remote precursors, through de novo synthesis of enzymes. This peculiarity makes deciphering their biosynthesis and regulation mechanisms very complex (Jeandet *et al.*, 2013). Some studies have attempted to determine the actual concentration and the nature of phytoalexins directly in plant tissues in response to invading microorganisms using spectroscopic methods (Becker *et al.*, 2014; Marti *et al.*, 2014; Valeriy *et al.*, 2019). But it observed difficult to analyze the events occurring under natural conditions between the plant and the pathogen. Singh and Chandrawat (2017) reviewed the role of phytoalexins in plant disease resistance in general. Pedras and Abdoli (2017) had given detail account of phytoalexins in family Cruciferae along with their role in pathogen defense. Some other important works accounted in this regard includes that of

ISOLATION OF HIGH YIELDING, NUTRITIONALLY IMPROVED CHICKPEA MUTANT LINES THROUGH INDUCED MUTAGENESIS USING GAMMA RAYS AND EMS

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Abstract: Chickpea (*Cicer arietinum* L.) is one of the major pulse crops in India. It is a major source of protein for populations that are vegetarian by choice or unaffordability of animal proteins. Chickpea cultivar 'Vijay' is a very old variety that is still popular among farmers of Maharashtra State. There is a scope to improve this cultivar in terms of yield and nutritional value. The present attempt focused on development of mutant lines with improved yield and nutrition using induced mutation. The Chickpea variety- 'Vijay' was treated with different doses of gamma rays (300Gy, 400 Gy, 500 Gy) and EMS (0.2%, 0.3%, 0.4%) and sown to grow M₁ generation. The M₁ was harvested on single plant basis and sown in next season as plant to row progeny to grow M₂ generation. M₂ generation was visually screened thoroughly for different types of mutations. Additionally the M₂ harvest was also screened for protein content using calorimetric methods. Total 171 mutants were selected based on yield, nutrition and earliness. These mutants were sown as plant to row in M₃ generation to study the breeding behavior. Out of these, 12 mutant lines were found to have higher yield than control Vijay, including 07 lines with bold seeds and one line with earliness in M₃ generation. The selected lines will be forwarded to advance generation (M₄ to M₅) to stabilize the yield contributing characters and then will be evaluated in various trials.

Keywords: *Cicer arietinum* L., Germplasm, Gamma rays, EMS, Mutant.

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is the second largest pulse crop, grown in over 50 countries, and traded across the globe [1]. Chickpea is valued and accepted globally for its nutritive seed composition and protein content as a substitute for animal protein [2]. Mutation breeding is an effective tool and playing vital role in crop improvement since its inception in agriculture. Induced mutation technique has proved to be successful for improving different traits in a wide variety of crops especially pulses. To date, more than 3,274 varieties in more than 224 plant species derived from mutagenesis programs have been officially released as listed in the FAO/IAEA Mutant Varieties Database (MVD).

Among these, 493 mutant varieties of pulses are registered, with 21 improved chickpea mutants released for cultivation [3, 4].

Mutation breeding is an additional advantage when there is a case of improvement of a good variety as it has to alter just one or two traits [5]. Genetic variability can be effectively induced through mutation and its practical applications are well recognized [6, 7]. Considering the rapidly increasing population and declining per capita pulses consumption in India, while also considering comparatively large area under its cultivation then other pulses, the chickpea production statistics over the last decade is not sufficient to meet the growing demand. Therefore, attempts are needed to

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Insights into Sustainable C–H Bond Activation

Dewal S. Deshmukh, Vaishali S. Shende, and Bhalchandra M. Bhanage

Abstract Over the recent past, the straight functionalization of inert C–H bond has already been identified as an advanced technique for the synthesis of organic molecules. It has provided a step-, pot- and atom-economic synthetic approach to attain structurally challenging organic scaffolds using simpler, pre-functionalized substrates by single operation and thereby arisen as a sustainable substitution to traditional organic transformations. Regardless of the clear evolution and improvements in metal-catalysed C–H functionalization reactions, these kinds of conversions quiet face considerable restrictions with respect to green chemistry regarding the catalyst reusability, media, time efficiency, energy efficiency, byproducts, requirement of additives as well as oxidants. Encouraged with the necessity for green and sustainable chemistry, researchers attempt further effective routes in this area for the construction of organic scaffolds. Recently, distinguished achievements were attained with the expansion of sustainable methodologies in C–H activation reactions. The attention of the book section is to summarize the progress of greener methodologies for C–H functionalization reactions which incorporate applications of greener solvents, microwave irradiation, photocatalysis, homogeneous recyclable catalytic systems, heterogeneous catalysts, oxidizing directing groups, electrochemical methods, etc., during the past few years. The book chapter emphasizes selected fascinating and encouraging examples of greener methodologies in C–H activation approaches.

Keywords C–H activation · Green-chemistry · Catalysis

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An update on role of salicylic acid (SA) in abiotic stress tolerance in crop plants: a review

Deepak Koche*, Ruchita Gandhi, Shubham Rathod, Rupali Shirsat

Koche D, Gandhi R, Rathod S, et al. An update on role of salicylic acid (SA) in abiotic stress tolerance in crop plants: a review. *AGBIR*. 2021;37(6):204-210.

Abiotic stresses have been recognized as the potential threat for agricultural production across the globe. Anthropogenic activities related to industrialization and urbanization also have aggravated the degradation of agricultural system as they are experiencing increasing impact of abiotic stresses. These stresses potentially induce various adverse effects on plants affecting their physiological, biochemical and molecular processes ultimately

leading huge loss in crop productivity. Plant hormones are recognized amongst the handiest tools to mitigate the abiotic stress. Salicylic acid (SA) is one of most essential and multifaceted plant hormone that not only play vital role in plant defense but also have active participation in conferring abiotic stress tolerance. The present review deals with the illustrations of studies carried out by different workers on the role of SA in combating various types of abiotic stresses like metal stress, salinity stress, temperature stress and water stress in different crops.

Key Words: Salicylic acid; Abiotic stress; Plant defense; Tolerance

INTRODUCTION

Human beings are continuously exploiting natural resources to fulfill their needs without any check; this has huge negative impact on climatic conditions and agriculture. Though, there is improvement in agriculture production, but other natural resources are declining and when these coupled with increasing population, the overall situation appears alarming. Food and Agriculture organization (FAO) predicted that by 2050, we need to enhance agricultural food production by 70% (FAO, 2009). The effects of changing climate like global warming showed direct effect on the plant production and as per the report of IPCC (2007) there will be increase in global temperature of earth by 2-4°C and this will further affect the agricultural productivity [1,2].

Any negative change in the existing climate is the major cause of abiotic and biotic stress observed in a particular region. Several abiotic stresses coupled with developmental activities like urbanization and industrialization have been assessed as the potential threats to the agricultural productivity [3]. The major abiotic stresses includes salinity stress, water stress (flooding and scarcity) metal/ metalloid stress, temperature stress (extreme temperature), nutrient stress (deficiency and excess) are some major issues for world agriculture [4-7]. All these abiotic stresses potentially modulate physiological, biochemical and molecular mechanism in plants irrespective to their developmental stages and cause severe loss in the yield of crop plants [8,9].

MATERIALS AND METHODS

Salicylic acid (SA): brief history

The name of salicylic acid (SA) was derived from the Latin word *Salix* (willow tree). The bark and leaves of willow tree used by Americans, Indians and Greeks to cure aches and fever. It has been documented that Hippocrates for the first time administered a drug to relieve pain of women during child birth and fever, it was salicylic acid. It was first isolated as glucoside of salicylic alcohol, salicin by a German scientist Johann Andreas Buchner. Later on it was reported from 36 other plants in addition to willow tree [10-13]. The phytohormone SA is a simple phenolic compound (C₇H₆O₃) with an aromatic ring to which one carboxylic and one hydroxyl group are attached. The biosynthesis of this molecule takes place through shikimate pathway, which later branched as isochlorogenic acid pathway and phenylalanine pathway. The most common pathway in plants for SA synthesis is isochlorogenic acid pathway. About 90% of SA in plant is synthesized by this pathway. However, SA biosynthesis may also be accomplished by phenylalanine pathway [14-16]. The route of synthesis of SA is schematically presented in (Figure 1). Earlier, it was reported to be involved in various physiological processes like

stimulation of root development, stomata closure, and reduced transpiration reversal of the effects of abscisic acid (ABA) (Davies, 2004) and regulation of gravitropism [17]. Yuan and Lin (2008) suggested that deficiency or very high concentration of SA increases the susceptibility of plants towards abiotic stress but moderate or optimal concentration (0.01 mM to 0.05 mM) of SA may be useful for abiotic stress tolerance.

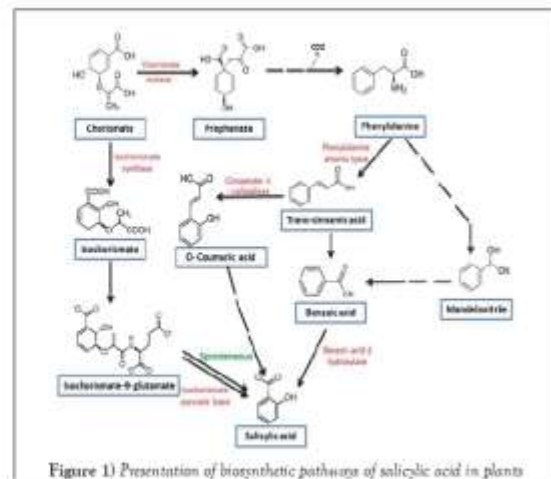


Figure 1) Presentation of biosynthetic pathways of salicylic acid in plants

METHODOLOGY

Salicylic acid (SA) in abiotic stress tolerance

SA was reported to play a vital role in improving abiotic stress tolerance in several crop plants. Khan had taken an overview of historical background and biosynthesis of salicylic acid under both optimal and stressful environments in plants. They have also illustrated potential mechanisms governing salicylic acid-induced plant abiotic stress-tolerance. Li suggested that SA acts upstream of NO under high concentration of carbon dioxide (CO₂) to induce enhanced flavonoid biosynthesis in tea plants. This indicates that SA enhanced biosynthesis of secondary metabolites in tea plants under the abiotic stress conditions. Zaid reported that in watermelon plants, resistance against root-knot nematode by red light is regulated by the coordination of

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N-Tosylhydrazone as an oxidizing directing group for the redox-neutral access to isoquinolines via Cp*Co(III)-Catalyzed C–H/N–N activation

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ABSTRACT

Herein, an efficient and economic access has been revealed for the synthesis of isoquinolines via C–H bond activation strategy by using comparatively inexpensive and versatile cobalt catalyst. A hardly investigated directing group, N-tosylhydrazone has been effectively applied as an internal oxidant for an annulation reaction with internal alkynes via C–H/N–N bond functionalization. This catalytic protocol works for the extensive variety of substrates in moderate to excellent yields under external oxidant-free conditions. Additionally, the proposed protocol has advantages such as broad substrate coverage with significant product yields, readily synthesized substrates as well as scalability up to the gram quantity which further improves the competency of the methodology.

1. Introduction

Isoquinoline and its derivatives represents the important class of organic molecules which possess different biological activities such as anti-tumour, anti-malarial, cardiovascular, anti-inflammatory, anti-HIV, etc. [1] They are also utilized for the development of numerous inhibitors, alkaloids chiral ligands and organic light-emitting diodes [2]. Thus, this moiety has achieved a great deal of attention in the field of medicinal and pharmaceutical chemistry (see Schemes 1 and 2).

Straight C–H bond activation has appeared to be an influential tactic in synthetic chemistry by creating new opportunities in the retrosynthetic strategies as well as enhancing the entire capability of the anticipated conversions [3]. Being atom economic, transition-metal assisted coupling transformations by direct C–H bond activation would streamline the synthetic processes and reduce the formation of unwanted by products. Various prior approaches on C–H bond activations are mainly centered around complexes of transition-metals such as Pd, Rh, Ir and Ru for the efficient synthesis of important organic scaffolds [4]. Due to the shortcomings of cost efficiency, sustainability, plenitude and poisonous nature, the second-row transition-metals possess limitations for the wide application in drug discovery as well as large-scale manufacturing of active pharmaceutical ingredients (API) and natural products which would be the final aim of synthetic chemistry research.

Therefore, taking into consideration the economic practicability of organic synthesis, there is a growing interest in developing catalysts in accordance with the economical first-row transition metals for C–H bond functionalization which represents an attractive alternative [5]. Among them, cobalt is having an extensive application of functionalizing the inactive C–H bonds [6]. Being fairly reactive, low-cost, abundant and comparatively less harmful by character in contrast to noble metals, it has turned into the centre of interest in the area of C–H activations. The initial Cp*Co(III)-catalyzed C–H activation reaction was reported by Matsunaga, Kanae, and co-workers in 2013 [7]. These Cp*Co(III) catalysts were proved to be suitable replacements to Cp*Rh(III) catalysts for C–H activations. A prevailing catalytic system utilizing Cp*Co(CO)I₂ [8] for C-2 selective C–H amidation of indoles with sulfonyl azides was testified by the same group [9]. Recently, new class of Cp*Co(III)-pNHC templates was utilized in catalytic annulation of azoles with internal alkynes [10].

Earlier, almost transition-metal-catalyzed C–H activation strategies required stoichiometric or super-stoichiometric amount of oxidizing agent in order to maintain the catalytic cycle. These are mostly toxic metal salts, which certainly gives rise to reduced atom-economy by generating off-cycle lateral transformations and unwanted waste. The constraint of the necessity of an oxidizing agent has been resolved by fixing a multifunctional group in substrate which plays the role of directing group and oxidizing agent both [11]. In this strategy, the

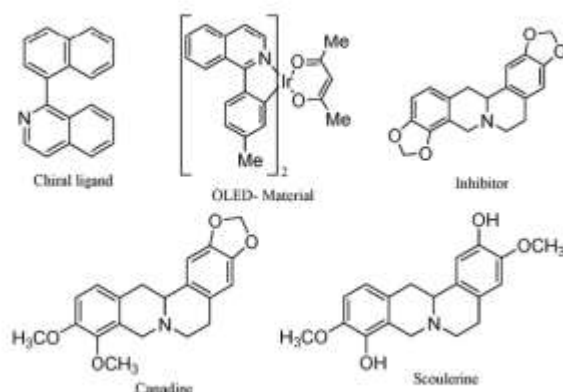
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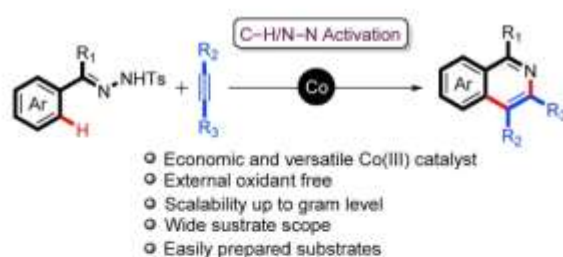
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Scheme 1. Demonstrative biologically active and other vital molecules containing isoquinoline skeleton.



Scheme 2. *N*-Tosylhydrazone directed redox-neutral synthesis of isoquinolines via Cp*Co(III)-catalyzed C-H activation.

cleavage of N-N, N-O or O-O bonds for the redox-neutral methods were employed as an essential tool. The technique has potential for the enhanced reactivity as well as has obvious merits of selectivity, better

yields and substrate coverage.

Due to the wealth of isoquinoline skeletons, many synthetic routes have been given for their synthesis that are established by Pomeranz-Fritsch, Pictet-Spengler, and Bischler-Napieralski reactions [12]. However, such approaches are suffered by some drawbacks like poor yield, low regioselectivity, limited substrate scope, longer reaction duration and tedious as well as harsh reaction conditions in some cases. To overcome these shortcomings, potent alternate routes were given by cyclization kind of transformations with alkynes through C-H bond activation [13]. Further, the 'external-oxidant-free' ideal strategy which is modest, secured, and ecologically benign also contributed in the rationalized access of isoquinolines via transition-metal-catalyzed C-H bond activations. Transition metals such as Pd [14], Ru [15] and Rh [13c, 16] were employed significantly for the streamlined synthesis of isoquinolines using "external-oxidant-free" approach. These catalysts showed effective catalytic activity, a wide substrate scope, and high functional group compatibility. However, comparatively low cost and abundant cobalt catalyst attracted scientists to give alternate inexpensive and efficient external oxidant free methodologies for the synthesis of isoquinolines. In these strategies, the N-O and N-N bonds have been employed as a significant handle for both C-N cyclization and catalyst turnover. Considering the N-O bond as an internal oxidant, in 2015, Ackermann [17], Sundararaju [18] and Matsunaga [19] groups, independently reported cobalt-catalyzed C-H/N-O activations for the synthesis of isoquinolines using different oxidizing directing groups. Subsequently, in 2016, Cheng [20] and Jegannathan [21] research groups reported Co catalyzed annulation reactions for the access of isoquinolines using similar strategy. Recently, in 2019, Song and co-workers mentioned Cp*Co(III)-free cobalt-catalyzed C-H activation using N,O-bidentate directing group in order to synthesize isoquinolines [22]. On the other hand, N-N bond was also recruited as an internal oxidant for the redox-neutral synthesis of isoquinolines. Zhu group [23] and Lade group [24], in 2016, reported C-H/N-N functionalization reactions for the synthesis of isoquinolines under external oxidant free conditions.

Our research group has also paid substantial attention for various protocols in order to access isoquinolines using different directing groups and transition-metals as catalysts [25]. In 2019, *N*-Cbz hydrazone was utilized as a directing group for the synthesis of isoquinolines using Cp*Co(III)-catalyst through C-H and N-N bond functionalization [25e].

Table 1
Optimization of reaction parameters.^a

Entry	Co Catalyst	Additive 1	Additive 2	Solvent	Temp (°C)	Time (h)	Yield ^b (%)
1	Co(OAc) ₂ ·4H ₂ O	AgSbF ₆	NaOAc	TFE	110 °C	24	–
2	[Cp*Co]Cl ₂	AgSbF ₆	NaOAc	TFE	110 °C	24	18
3	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	TFE	110 °C	24	34
4 ^c	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	TFE	110 °C	24	35
5 ^d	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	TFE	110 °C	24	21
6	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	1,2-DCE	110 °C	24	Trace
7	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	MeOH	110 °C	24	–
8	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	TAA	110 °C	24	–
9	[Cp*Co(CO)] ₂	AgSbF ₆	NaOAc	HFIP	110 °C	24	54
10	[Cp*Co(CO)] ₂	AgSbF ₆	KOAc	HFIP	110 °C	24	59
11	[Cp*Co(CO)] ₂	AgSbF ₆	CoOAc	HFIP	110 °C	24	66
12	[Cp*Co(CO)] ₂	AgSbF ₆	AcOH	HFIP	110 °C	24	84
13	[Cp*Co(CO)] ₂	KPF ₆	AcOH	HFIP	110 °C	24	49
14	[Cp*Co(CO)] ₂	AgSbF ₆	AcOH	HFIP	100 °C	24	83
15	[Cp*Co(CO)] ₂	AgSbF ₆	AcOH	HFIP	90 °C	24	63
16	[Cp*Co(CO)] ₂	AgSbF ₆	AcOH	HFIP	100 °C	12	81
17	[Cp*Co(CO)] ₂	AgSbF ₆	AcOH	HFIP	100 °C	10	69

^a reaction conditions: ketazine **1a** (0.2 mmol), diphenylacetylene **2a** (0.4 mmol), Co catalyst 10 mol%, Additive 1 (20 mol %), Additive 2 (20 mol%), Solvent 2 mL.

^b GC yield.

^c 15 mol% Co catalyst was used.

^d 5 mol% Co catalyst was used. TFE: 2,2,2-Trifluoroethanol; 1,2-DCE: 1,2-Dichloroethane; MeOH: Methanol; TAA: *tert*-Amyl alcohol; HFIP: Hexafluoro-2-propanol.

**Physico-chemical, Fluorescent and Phytochemical analysis of
Anisochilus carnosus (L.f.) Wall: a Lamiaceae herb from
Maharashtra, India**

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Abstract

Anisochilus carnosus (L. f.) Wall is one of the wild and aromatic lamiaceae members with significant medicinal potential. It is being used by Bhilla and Paliyar tribals from Maharashtra and Tamil Nadu states as indigenous traditional medicine. Present work is focused on the physico-chemical and fluorescent analysis of powdered drug material of the leaves of the plant and its phytochemical analysis. The study showed that the plant is rich in phytoconstituents like alkaloids, phenolics, flavonoids, terpenes and steroids. Further, HPLC analysis reveals the availability of caffeic acid, luteolin-7 glucoside, nepetin-7 glucoside, homoplantagenin, luteolin and ursolic acid with the highest content of homoplantagenin (4.20 µg/g dry drug sample) followed by nepetin-7 glucoside (3.80 µg/g dry drug sample). The plant sample has rich diversity of phytoconstituents. The identified phytoconstituents are correlated with bioactivities of the plant to validate traditional medicinal claims of the plant.

Natural products and plant derived herbal remedies are getting increased attention since last two decades. Throughout the human history, many infectious diseases have been treated with herbal medicines. A number of scientific investigations have highlighted the importance and the contribution of several thousand medicinal plants. The wealth of Indian medicinal plants is well documented with their active principles and properties^{9,23}.

The medicinal plants play vital role in routine healthcare, holistic growth, health and well beings, especially in rural areas of India²⁹.

The use of all botanicals is well rooted in medical practice. Since ancient times, herbal healers collected information about herbs and developed well-defined pharmacopoeias to treat a variety of diseases and disorders. More than a quarter of all drugs used today contain