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

3.5.1.

Number of Collaborative activities for research, Faculty exchange, Student exchange/ internship per year (10)

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

3.5.1. Number of Collaborative activities for research, Faculty exchange, Student exchange/ internship per year (10)

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.Sawarkar 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 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)

Inaugural program of Free Employability Training prgram

A training session

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

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)

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

5) The first Warhad Lok-kala Sammelan (Folk Meet) organized by Department of Marathi, Shri Shivaji College of Arts Commerce and Science, Akola under the aegis of Maharashtra Sahitya Sanskruti Mandal, Mumbai in collaboration with Warhad Shaikshanik, Samajik, Sanskrutik Bahuuddeshiya Sanstha, Loni. (20-12- 2018)

सांस्कृतिक पाऊलखुणा

श्री शिवाजी महाविद्यालय कला, वाणिज्य, विज्ञान महाविद्यालय, अकोला

स्व. डॉ.डी देशमुख : चित्रपट निर्मिती - देवकीनंदन गोपाला, राघूमैना.
आयोजन - आंतरविद्यापीठ सांस्कृतिक महोत्सव.
डॉ. विठ्ठल वाघ : प्रवर्तक - ललित कला अकादमी.
पटकथा, संवाद लेखन - देवकीनंदन गोपाला, राघूमैना (चित्रपट-शासन पुरस्कार).काज (टेलीफिल्म), गोट्या (मालिका).
पुरस्कार - शासनाचा केशवसुत पुरस्कार (पाऊलखुणा), शासनाचा नाट्यस्पर्धेत प्रथम व सर्वोत्कृष्ट नाट्यलेखन पुरस्कार (अंधार यात्रा), संशोधनाचा पुरस्कार (वऱ्हाडी म्हणी व लोकधर्म), शासनाचा आधारित लेखन पुरस्कार (म्हणी कवन).
अध्यक्ष - ४१ वे विदर्भ साहित्य संघ, कारंजा, १ ले कामगार साहित्य संमेलन, अकोला
प्रा. किशोर मोरे : कला दिग्दर्शन - राघूमैना(शासकीय पुरस्कार).
लेखसंग्रह - दुगाण्या.

प्रा. नारायण कुलकर्णी (साहित्य), भिमराव पांचाळे, संध्या उखळकर, प्रा. किशोर देशमुख (गायन), गौरी पंडले, पद्माकर रारप , प्रा.मधु जाधव, मंगला वाकोडे, आत्मानंद बोंडे, अशोक बेरे, कृष्णा देशमुख, ओंकार पाटील (अभिनय), विशाल कोरडे (वादन-तबला).

वऱ्हाड शैक्षणिक, सामाजिक व सांस्कृतिक, बहुउद्देशीय संस्था, लोणी

स्थापना :- २३/०४/२०१२ नों. क्र. :- एक १३५२३ अकोला.
कार्य :- १. लोककथा, लोकगीत यांचे संकलन, लोककलेचे जतन आणि संकलनाचे कार्य.
२. महाराष्ट्र राज्य नाट्य स्पर्धा व महाराष्ट्र कामगार कल्याण स्पर्धेमध्ये डॉ. राजसाहेब वाळे लिखित हिंदिज्जो कॉलिन (कामगार कल्याण मंडळाचा सर्वोत्कृष्ट नाट्यलेखन पुरस्कार), लांबजाना (वाळे यांना अभिनयाचा शासकीय पुरस्कार), कुत्रीची हिरेवाटणी या तीन नाटकांचे सादरीकरण. ३. माध्यमिक शालांत परीक्षेमध्ये विद्यार्थ्यांना साहसीचे गुण देण्याकरिता संस्थेला सांस्कृतिक कार्य संचालनालयाकडून प्रमाणपत्र.

संमेलन दिवस

हे संमेलन संत गाडगे बाबा यांच्या स्मृतिदिनानिमित्त आयोजित केले आहे.
संत गाडगेबाबा यांनी कीर्तन या लोककला प्रकाराची वेगळी मांडणी करून जनसामान्यांच्या बोलीभाषेत समाज प्रबोधन केले.

महाराष्ट्र राज्य साहित्य संस्कृती मंडळ, मुंबई प्रस्तुत
वऱ्हाड शैक्षणिक, सामाजिक व सांस्कृतिक बहुउद्देशीय संस्था, लोणी
यांच्या संयुक्त विद्यमाने आयोजित

पहिले वऱ्हाड लोककला साहित्य संमेलन

संमेलनाध्यक्ष : डॉ. हरिश्चंद्र बोरकर
उद्घाटक : डॉ. रमेश सूर्यवंशी स्वागताध्यक्ष : प्राचार्य डॉ. रामेश्वर भिसे

दिनांक २० डिसेंबर, २०१८ वेळ सकाळी १०.०० वा
स्थळ
श्री शिवाजी कला, वाणिज्य व विज्ञान महाविद्यालय, अकोला

सस्नेह निमंत्रण

प्रति,

लोककलेवर आधारित वऱ्हाड लोककला साहित्य संमेलनात आपण सहभागी व्हावे, ही विनंती.

पहिल्या वऱ्हाड लोककला साहित्य संमेलनात विविध लोककला सादर

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

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

Inaugural function of the University Level Poster competition

Guests and Experts observing the students posters

8) The 2nd Warhad Lok-kala Sammelan (Folk Meet) organized by Department of Marathi, Shri Shivaji College of Arts Commerce and Science, Akola under the aegis of Maharashtra Sahitya Sanskruti Mandal, Mumbai in collaboration with Warhad Shaikshanik, Samajik, Sanskrutik Bahuuddeshiya Sanstha, Loni. (10-10- 2019)

Inaugural function of 2nd Folk Meet (10/10/2019)

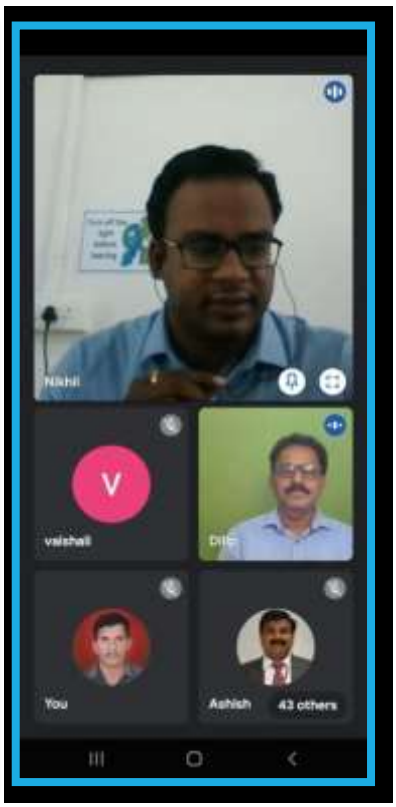
9) Inter-University Poster Competition and Photo Exhibition organized by Department of Botany, Shri Shivaji College of Arts, Commerce and Science, Akola in Collaboration with Indian Science Congress Association, Amravati Chapter (01/02/2020)

Valedictory function of the competition.

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)

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)

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).



FLORENTIS PHARMACEUTICALS PVT. LTD.
S.No.80,Near JSPM Shahu College,
New Pune - Mumbai Bypass Highway, Tathawade,
Pune - 411 033, India.Phone: (+91) 800 774 8844
info@florentispharma.com,www.florentispharma.com
CIN: U24100PN2011PTC140877
GSTIN 27AABCF9186A1ZN

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,

Dr. Shriram Kotkar

Managing Director,

Florentis Pharmaceuticals Pvt. Ltd.

Tathawade

Pune – 411033

For FLORENTIS PHARMACEUTICALS PVT. LTD.

DIRECTOR

FLORENTIS PHARMACEUTICALS PVT. LTD. PUNE

OUR PARTNER IN INNOVATIVE RESEARCH

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

SHRI RADHAKISAN LAXMINARAYAN TOSHNIWAL COLLEGE OF SCIENCE, AKOLA

(R. L. T. COLLEGE OF SCIENCE)

CIVIL LINES, 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

Florentis
Pharmaceuticals

FLORENTIS PHARMACEUTICALS PVT. LTD.
S.No.80,Near JSPM Shahu College,
New Pune - Mumbai Bypass Highway, Tathawade,
Pune - 411 033, India.Phone: (+91) 800 774 8844
info@florentispharma.com,www.florentispharma.com
CIN: U24100PN2011PTC140877
GSTIN 27AABCF9186A1ZN

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

DIRECTOR

Dr. Shriram Kotkar

Managing Director,

Florentis Pharmaceuticals Pvt. Ltd.

Tathawade

Pune – 411033

FLORENTIS PHARMACEUTICALS PVT. LTD. PUNE

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)

CIVIL LINES, AKOLA - 444 001 (MAHARASHTRA)

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WITH CGPA - 3.12

COLLEGE CODE - 210
Website : www.rltsc.org
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

FLORENTIS PHARMACEUTICALS PVT. LTD.

S.No.80,Near JSPM Shahu College,
New Pune - Mumbai Bypass Highway, Tathawade,
Pune - 411 033, India.Phone: (+91) 800 774 8844
info@florentispharma.com,www.florentispharma.com
CIN: U24100PN2011PTC140877
GSTIN 27AABCF9186A1ZN

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

DIRECTOR

Dr. Shriram Kotkar

Managing Director,

Florentis Pharmaceuticals Pvt. Ltd.

Tathawade

Pune – 411033

FLORENTIS PHARMACEUTICALS PUNE LTD

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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WITH CGPA - 3.12

COLLEGE CODE - 210
Website : www.rltsc.org
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.)

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WITH CGPA - 3.12

COLLEGE CODE - 210
Website : www.rltsc.org
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 **Sl. 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	PROF. ALOK DHAWAN	DR. SHEKHAR C. MANDE
DIRECTOR	**DIRECTOR**	**DIRECTOR GENERAL, CSIR**
CSIR-NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY	**CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH**	**SECRETARY, DSIR, GOVT. OF INDIA**


अनुसंधान भवन


CSIR-NEIST

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

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	PROF. ALOK DHAWAN	DR. SHEKHAR C. MANDE
DIRECTOR	DIRECTOR	DIRECTOR GENERAL, CSIR
CSIR-NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY	CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH	SECRETARY, DSIR, GOVT. OF INDIA


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CSIR-NEIST

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 **Sl. 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	PROF. ALOK DHAWAN	DR. SHEKHAR C. MANDE
DIRECTOR	DIRECTOR	DIRECTOR GENERAL, CSIR
CSIR-NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY	CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH	SECRETARY, DSIR, GOVT. OF INDIA


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CSIR-NEIST

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 TOXICOLOGY RESEARCH

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


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CSIR-NEIST

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

DR. G. NARAHARI SASTRY	PROF. ALOK DHAWAN	DR. SHEKHAR C. MANDE
DIRECTOR	DIRECTOR	DIRECTOR GENERAL, CSIR
CSIR-NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY	CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH	SECRETARY, DSIR, GOVT. OF INDIA


अनुसंधान भवन


CSIR-NEIST

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

JUNE TO AUGUST, 2020

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

NAME: Shraddha 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: Shraddha Dongre **Sl. 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	PROF. ALOK DHAWAN	DR. SHEKHAR C. MANDE
DIRECTOR	DIRECTOR	DIRECTOR GENERAL, CSIR
CSIR-NORTH EAST INSTITUTE OF SCIENCE AND TECHNOLOGY	CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH	SECRETARY, DSIR, GOVT. OF INDIA


अनुसंधान भवन


CSIR-NEIST

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
CSIR-NEIST, Jorhat

Dr. G. Narahari Sastry
Director, CSIR-NEIST
Jorhat, Assam

FLYVIEW GIS TECHNOLOGY PVT LTD
CIN- U74999MH2018PTC304422
PAN – AADCF2955P

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30/01/2020

INTERNSHIP CERTIFICATE

This is to certify that **Miss. Ankita Shrikrushna Dharme**, a student of **M. Sc. Geoinformatics, Shri Shivaji College of Arts, Commerce and Science, Akola** has successfully completed internship programme on ***"Advanced GIS and Remote Sensing data processing and mapping"*** from **2 Jan -30 Jan 2020** at **Geotech GIS Training Institute, Aurangabad**. During the period of her internship programme she has been found punctual, hardworking and inquisitive.

We wish him every success in life.

Mr.Aniket R.Borgawkar
Director
Geotech GIS Training
Institute & Consultancy
Aurangabad

directorgeotechinstitute@gmail.com
Website: www.geotechinstitute.com
Mob.No.9096244262, 9284471310
0240-2951199
Address: Plot No.09/10, Vishal Nagar, Opposite CADA Office, 7-Hill To Gajanan Maharaja Temple Road, Above Indore Boring Works, IInd Floor, Aurangabad 431001 Maharashtra, India

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* QGIS & WEB GIS * HARD CORE RECRUITMENT * INDUSTRIAL MANPOWER CONSULTANGT * MANPOWER JOBS IN INDIA

30/01/2020

INTERNSHIP CERTIFICATE

This is to certify that **Miss. Mohini Suresh Jayale**, a student of **M. Sc. Geoinformatics, Shri Shivaji College of Arts, Commerce and Science, Akola** has successfully completed internship programme on ***"Advanced GIS and Remote Sensing data processing and mapping"*** from **2 Jan -30 Jan 2020** at **Geotech GIS Training Institute, Aurangabad**. During the period of her internship programme she has been found punctual, hardworking and inquisitive.

We wish him every success in life.

Mr.Aniket R.Borgawkar
Director
Geotech GIS Training
Institute & Consultancy
Aurangabad

directorgeotechinstitute@gmail.com
Website: www.geotechinstitute.com Mob.No.9096244262, 9284471310 0240-2951199
Address: Plot No.09/10, Vishal Nagar, Opposite CADA Office, 7-Hill To Gajanan Maharaja Temple Road, Above Indore Boring Works, IInd Floor, Aurangabad 431001 Maharashtra, India

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PAN – AADCF2955P

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* QGIS & WEB GIS * HARD CORE RECRUITMENT * INDUSTRIAL MANPOWER CONSULTANGT * MANPOWER JOBS IN INDIA

30/01/2020

INTERNSHIP CERTIFICATE

This is to certify that **Miss. Sneha Arun Pande**, a student of **M. Sc. Geoinformatics, Shri Shivaji College of Arts, Commerce and Science, Akola** has successfully completed internship programme on ***"Advanced GIS and Remote Sensing data processing and mapping"*** from **2 Jan -30 Jan 2020** at **Geotech GIS Training Institute, Aurangabad**. During the period of her internship programme she has been found punctual, hardworking and inquisitive.

We wish him every success in life.

Mr.Aniket R.Borgawkar
Director
Geotech GIS Training
Institute & Consultancy
Aurangabad

directorgeotechinstitute@gmail.com
Website: www.geotechinstitute.com Mob.No.9096244262, 9284471310 0240-2951199
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PAN – AADCF2955P

GeoTech

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* QGIS & WEB GIS * HARD CORE RECRUITMENT * INDUSTRIAL MANPOWER CONSULTANGT * MANPOWER JOBS IN INDIA

30/01/2020

INTERNSHIP CERTIFICATE

This is to certify that **Mr. Shubham Suresh Ghayal**, a student of **M. Sc. Geoinformatics, Shri Shivaji College of Arts, Commerce and Science, Akola** has successfully completed internship programme on ***"Advanced GIS and Remote Sensing data processing and mapping"*** from **2 Jan -30 Jan 2020** at **Geotech GIS Training Institute, Aurangabad**. During the period of his internship programme he has been found punctual, hardworking and inquisitive.

We wish him every success in life.

Mr.Aniket R.Borgawkar
Director
Geotech GIS Training
Institute & Consultancy
Aurangabad

directorgeotechinstitute@gmail.com

Website: www.geotechinstitute.com Mob.No.9096244262, 9284471310 0240-2951199

Address: Plot No.09/10, Vishal Nagar, Opposite CADA Office, 7-Hill To Gajanan Maharaja Temple Road, Above Indore Boring Works, IInd Floor, Aurangabad 431001 Maharashtra, India

FLYVIEW GIS TECHNOLOGY PVT LTD
CIN- U74999MH2018PTC304422
PAN – AADCF2955P

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30/01/2020

INTERNSHIP CERTIFICATE

This is to certify that **Miss. Bhagyashri Sunil Natkar**, a student of **M. Sc. Geoinformatics, Shri Shivaji College of Arts, Commerce and Science, Akola** has successfully completed internship programme on ***"Advanced GIS and Remote Sensing data processing and mapping"*** from **2 Jan -30 Jan 2020** at **Geotech GIS Training Institute, Aurangabad**. During the period of her internship programme she has been found punctual, hardworking and inquisitive.

We wish him every success in life.

Mr.Aniket R.Borgawkar
Director
Geotech GIS Training
Institute & Consultancy
Aurangabad

directorgeotechinstitute@gmail.com
Website: www.geotechinstitute.com Mob.No.9096244262, 9284471310 0240-2951199
Address: Plot No.09/10, Vishal Nagar, Opposite CADA Office, 7-Hill To Gajanan Maharaja Temple Road, Above Indore Boring Works, IInd Floor, Aurangabad 431001 Maharashtra, India

FLYVIEW GIS TECHNOLOGY PVT LTD
CIN- U74999MH2018PTC304427
PAN – AADCF2955P

GeoTech
GIS TRAINING INSTITUTE & CONSULTANCY SERVICES

*GIS SOFTWAER TRAINING * WATERSHED MAPPING * E-TENDERING * SOFTWAER & WEB DEVELOPER * ASSET MAPPING
* QGIS & WEB GIS * HARD CORE RECRUITMENT * INDUSTRIAL MANPOWER CONSULTANGT * MANPOWER JOBS IN INDIA

30/01/2020

INTERNSHIP CERTIFICATE

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Novel synthesis of some *N*-glycosyl benzimidazolyl thiocarbamides and their antimicrobial activity

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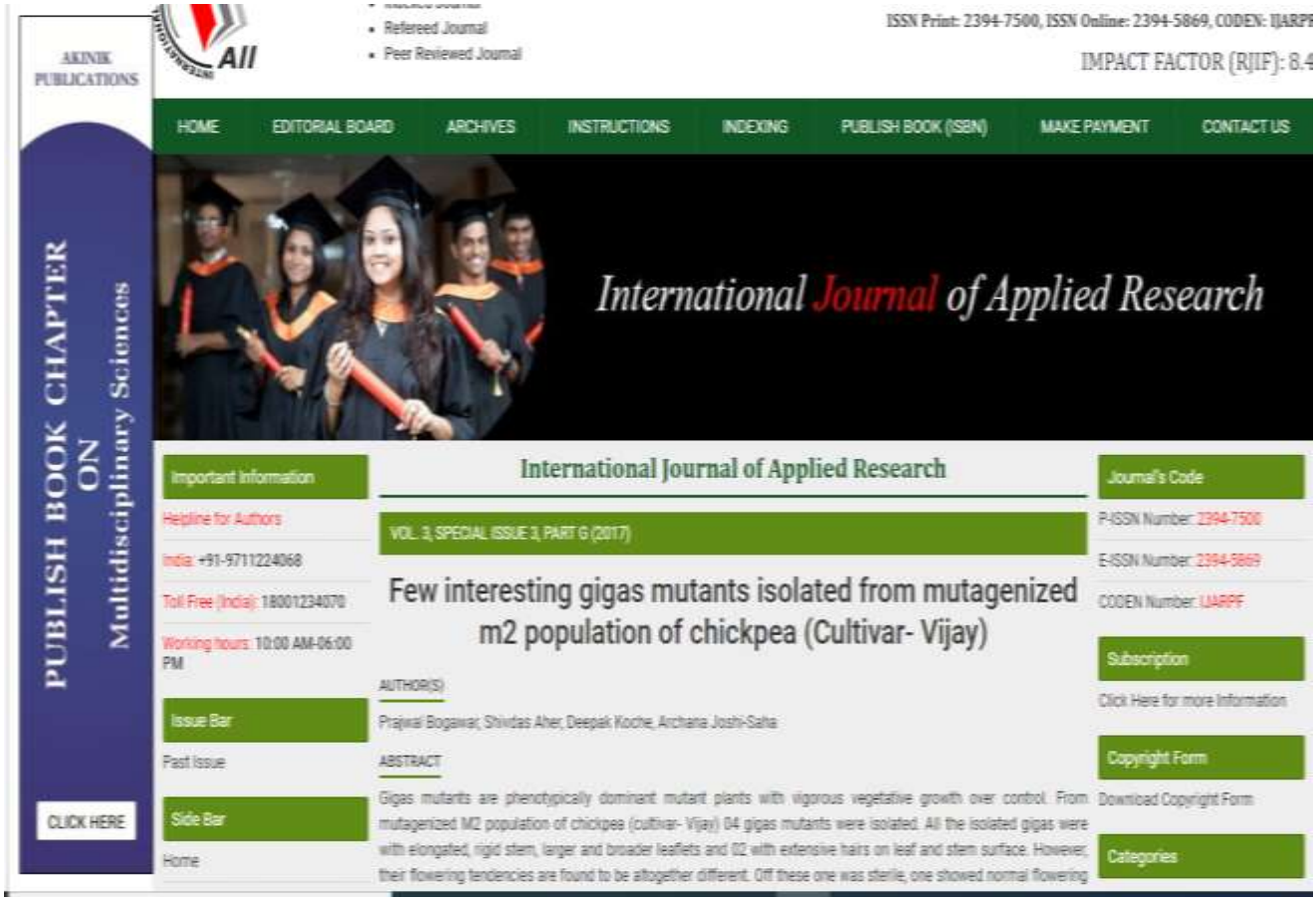
Manuscript received online 25 July 2015, accepted 09 August 2016

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, ^{1}H 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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Photoluminescence properties of $KSrPO_4:Sm^{3+}$ phosphor for SSL applications

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

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Abstract

The orange light emitting $KSr_{(1-x)}PO_{4:x}Sm^{3+}$ (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 $KSrPO_4:Sm^{3+}$ phosphor was confirmed by powder XRD analysis and studied its photoluminescence (PL) properties under ultraviolet

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Influence of film thickness and Fe doping on LPG sensing properties of Mn_3O_4 thin film grown by SILAR method

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

M. R. Belkhedkar[1,2,b] and A. U. Ubale[2,a]

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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

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1. S.S.V.P.S's 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-benzyldithiocarbazate 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 thioenoilicsulphur. 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

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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; KOCHE *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 charac-teristics, amongst these about 350 phytochemicals

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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 KOCHE 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 arientinum* L.) is a good source of protein, carbohydrates, minerals and fibres (Jukanti *et al*., 2012) and is being consumed for 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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INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

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

[1]Prajwal Bogawar, [2,*]Deepak Koche and [3]Archana Joshi-Saha

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Chickpea,
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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 M_2 population was studied in one *desi* (Vijay) and one *kabuli* (PKV-2) varieties of chickpea. In M_2 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 M_2 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.

Citation: Prajwal Bogawar, Deepak Koche and Archana Joshi-Saha, 2017. "Genetic variability of morphological mutants induced by gamma rays and ems in chickpea (variety-vijay and pkv-2)", *International Journal of Current Research*, 9, (08), 56320-56324.

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 immorality 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.

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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

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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 ^{1}H 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 biomedicinal 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-phenylethyamine 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 isothocarbamoyl 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-isodithocarbamate 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, Isodithocarbamate, *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 activity[1-3].

Organosulfur compounds play an important role in modern organic synthesis. In laboratory there are various reports on sugar heterocyclic possessing antimicrobial and antifungal activities[4-10]. 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-isodithocarbamate 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, ^{1}H NMR and mass spectral analysis (Experimental) and elemental analysis (Table 1) clearly indicated the product and assign the structure as 4-phenyl-5-phenylimino-

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An alternative synthesis of the CNS stimulant Prolintane

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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

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

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$CaCl_2$ 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, $CaCl_2$

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 conditions[1]. Different reagents used for the acetyl protection of amines are acetic anhydride[2], acetyl chloride[3], acetyl acetone[4], acetic acid[5], zinc acetate[6] and thioacid[7]. 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 anhydride[8].

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 ($CaCl_2$) is a readily available, inexpensive reagent used for dehydration and recently gaining momentum as a green catalyst in various organic transformations. To exemplify, $CaCl_2$ has been used in Mannich reaction[10], Kabachnik-Fields three component reaction[11] 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-dioxooctahydroxanthene[14].

Results and Discussion

These findings motivated us to extend the utility of $CaCl_2$ in facile organic transformations, herein we report for the first time an efficient, environmentally benign, low cost and clean protocol for acetamide synthesis using $CaCl_2$. Initially, we carried out the reaction with equimolar quantities of aniline and acetic anhydride in presence of 10 mol% $CaCl_2$ 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 (Sio_2-H_3BO_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 (SiO_2-H_3BO_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] $HClO_4$-SiO_2,[4] $Zn(ClO_4)_2.6H_2O$,[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 (SiO_2-H_3BO_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, Parveen[11] *et al* utilized SiO_2-H_3BO_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 (SiO_2-H_3BO_3) for *N*-Boc protection of amines. SiO_2-H_3BO_3 catalyst was prepared using standard procedure[14] 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^{0}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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ABSTRACT

Anisochilus carnosus (Lamiaceae) is annual herb with traditional medicinal properties as antiulcer, expectorant, stimulant and antihepatic 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: *Ansochilus 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.,

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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 methodand 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

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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 physic-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. wallichi* 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 diarrhea (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, 21, 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 physic-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 □m and dried further at 100°C until achieve constant weight.

Physic-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).

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DISCOVERY Agriculture

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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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 M_2 population. Their sister progenies were harvested as single plants and grown as plant to row M_3 progenies to observe the inheritance pattern. In resulting progenies, the ratio of normal plant types to mutant

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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 rebiei*. 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

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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 M_1 generation. The M_1 was harvested on single plant basis and sown in next season as plant to row progeny to grow M_2 generation. M_2 generation was visually screened thoroughly for different types of mutations. Additionally the M_2 harvest was also screened for protein content using calorimentric methods. Total 171 mutants were selected based on yield, nutrition and earliness. These mutants were sown as plant to row in M_3 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 M_3 generation. The selected lines will be forwarded to advance generation (M_4 to M_6) 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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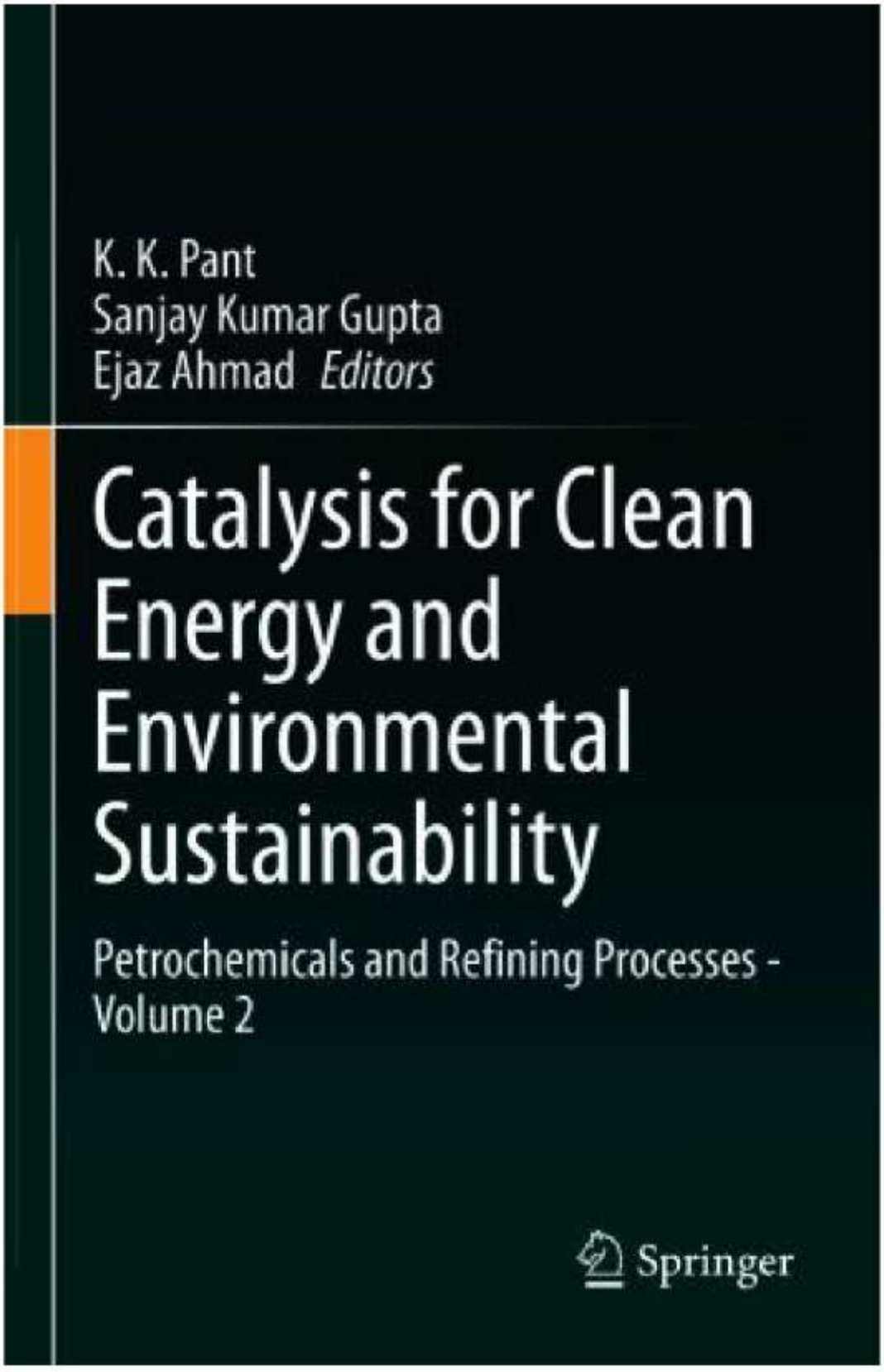
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Contents

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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RESEARCH ARTICLE

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 2-4oC 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 relive 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 ($C_7H_6O_3$) 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 isochorimate pathway and phenylalanine pathway. The most common pathway in plants for SA synthesis is isochorismate 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 rout of synthesis of SA is schematically presented in (Figure1). 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.

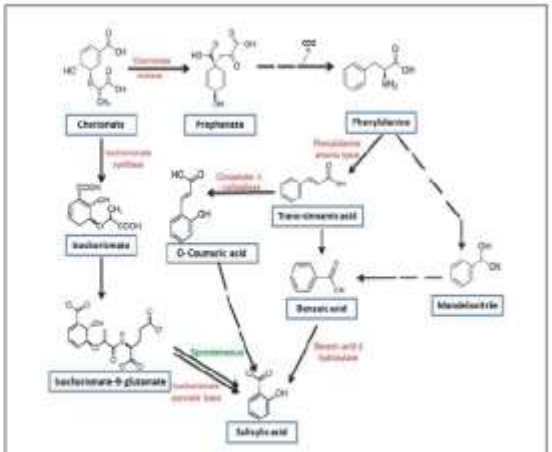

Figure 1) *Presentation of biosynthetic pathways of salicylic acid in plants*

METHODOLOGY

Salicylic acid (SA) in abiotic stress tolerance

LSA 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 (CO_2) 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 turn 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, Kanai, 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)-*p*NHC 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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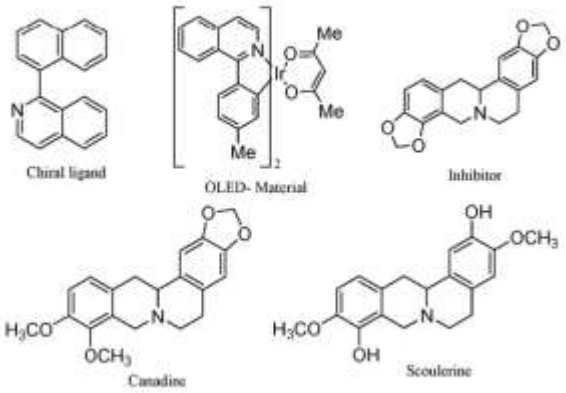
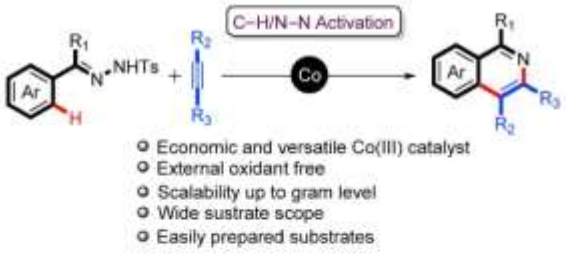


Scheme 1. Demonstrative biologically active and other vital molecules containing isoquinoline skeleton.



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 Jeganmohan [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*-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	$Co(OAc)_2.4H_2O$	$AgSbF_6$	NaOAc	TFE	110 °C	24	–
2	$[Cp^*CoI_2]_2$	$AgSbF_6$	NaOAc	TFE	110 °C	24	18
3	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	TFE	110 °C	24	34
4[c]	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	TFE	110 °C	24	35
5[d]	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	TFE	110 °C	24	21
6	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	1,2-DCE	110 °C	24	Trace
7	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	MeOH	110 °C	24	–
8	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	TAA	110 °C	24	–
9	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	NaOAc	HFIP	110 °C	24	54
10	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	KOAc	HFIP	110 °C	24	59
11	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	CsOAc	HFIP	110 °C	24	66
12	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	AcOH	HFIP	110 °C	24	84
13	$[Cp^*Co(CO)I_2]$	KPF_6	AcOH	HFIP	110 °C	24	49
14	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	AcOH	HFIP	100 °C	24	83
15	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	AcOH	HFIP	90 °C	24	63
16	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	AcOH	HFIP	100 °C	12	81
17	$[Cp^*Co(CO)I_2]$	$AgSbF_6$	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.

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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 (4.20µg/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 India[29].

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