

**UNIVERSITY OF HORTICULTURAL SCIENCES,
BAGALKOT, KARNATAKA**



**SELF STUDY REPORT FOR THE
Ph.D. IN PLANTATION, SPICES,
MEDICINAL AND AROMATIC CROPS,
COH, BENGALURU, 2014-15 to 2018-19**

SUBMITTED TO
**Indian Council of Agricultural Research,
Krishi Bhavan, New Delhi.**

SUBMITTED BY
**University of Horticultural Sciences,
Udyanagiri, Bagalkot – 587 104
Karnataka**

PREFACE

Horticulture - a science of production and management of plants for food, comfort, feed, recreation, and beauty – is potentially vital in raising agricultural production, value addition, farm income and employment in the country. In the context of hazards like climate change, scarcity of water, labour problem etc., Horticulture is contributing incessantly in planning sustainable development goals. After UN General Assembly Summit held on January 1st of 2016, India has adopted 17 SDGs and 169 targets to strengthen health and economy of the nation. Modern era of digitalization has introduced new perspectives like digital horticulture, precision farming, climate smart farming, and nutritional security into the prospectus of horticulture.

Karnataka was the first state in the country to recognize the potential of horticulture sector to bring prosperity to the farmers. To increase the focus on the sector, the state took the lead and created the country's first Horticulture Department and other states followed the example of Karnataka. Presently Karnataka is placed second in horticulture performance in the entire country and the state received 'Best State in Horticulture' award in 2015. Karnataka is the highest exporter of cashew, roses, gherkins, rose onions, spices and condiments. The state has achieved remarkable progress in many fronts from production to storage, packaging and marketing of fruits, vegetables, flowers and plantation crops.

The horticulture sector, which includes a wide variety of crops such as fruits, vegetables, spices, plantation crops, floriculture, medicinal and aromatic plants etc., is recognized as an important sector for potential diversification and value addition for the sustainability of the farmers. It has been recognized that growing horticulture crops is now an ideal option to improve livelihood security; enhance employment generation; attain income and food security; and increase income through value addition.

After its establishment in 2008, University of Horticultural Sciences, Bagalkot established RHREC in a newly transferred land of 125 acres at its campus in Bengaluru in the year 2010 and in the year 2011 Post Graduation Centre was established. Initially the campus was called as Post Graduation Centre but with the commencement of Bachelor's degree programme and two year diploma course in the year 2014, it was re-christened as College of Horticulture.

The college is striving hard to impart quality education in terms of theory, research and extension. The college is gathering laurels through the performance of teachers as well as

the students. The college has an excellent track record in both academics and co-curricular activities.

ICAR, through an accreditation procedure of its own is assessing facilities available and to improve the quality of education rendered by the college. After accreditation, by the financial support of ICAR and State Government, the growth and developmental activities of the college will be improved further to a greater extent. Since the college is due for accreditation by ICAR the present report provides all the necessary information about the college activities performed during last five years.

The University level task force and steering committee is gratefully acknowledged for the help, guidance and suggestions given in preparing the report. The College level steering committee and task force have done a great job in compiling information and bringing out this report to be submitted to Accreditation Board of ICAR. I gratefully thank all those who have helped in preparing this report.



Dean
(VISHNUVARDHANA)
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6.4.1 BRIEF HISTORY OF THE DEGREE PROGRAMME

Evolution of the P.G. programme:

Division of Horticulture, UAS Bangalore is a reputed centre of excellence for plantation, spices, medicinal and aromatic crops, was offering PG programme on horticulture in relation to PSMA. When separate University of Horticultural Sciences, Bagalkot was formed, the majority of the senior faculty who were offering courses for UG and PG in plantation, spices, medicinal and aromatic crops at UAS, Bangalore were shifted to UHS Bagalkot. Besides the faculty of UHS, the university have good support from the reputed institutes like IIHR, CIMAP, UAS, Bengaluru and TDU (Trans disciplinary University) etc. The senior scientists are offering PG courses and guiding M.Sc and Ph.d students apart from providing research facilities. Similarly the university also have the good access of horticulture crop related globally reputed private companies like Himalaya, Sami labs, Arora chemicals, natural remedies *etc* which are based in Bangalore and they give contract farming to the farmers. Hence, there is continuous need of quality manpower to develop advanced technologies to plantation, spices, medicinal and aromatic crops to cater the ever growing needs of industries and farmers involved in cultivation. The Ph.D degree programme was started during the year 2016-17.

Mandates

- i. Teaching:** Quality human resource development with master's and doctoral level on PSMAC
- ii. Research:**
 - Systematic research on crop improvement in plantation, spices medicinal and aromatic crops for their yield, quality and resistant to biotic and abiotic stresses.
 - Developing suitable propagation techniques for quality planting material production and rootstock studies for biotic and abiotic stresses.
 - Developing suitable good horticultural practices in plantation, spices, medicinal and aromatic crops
 - Developing suitable postharvest management practices and value addition to the PSMA produces
- iii. Extension:**
 - Entrepreneurship development, training, farm advisory to the extension functionaries in plantation, spices, medicinal and aromatic crops.

Objectives

i. Teaching:

- Quality human resource development at masters level [M.Sc (Hort.) PSMAC] to suit industrial, extension, scientist and teaching needs.
- Quality human resource development at doctoral level [Ph.d (PSMAC)] to the needs of researchers, scientists, teaching, extension and industrial needs.
- To develop quality diploma holders in plantation, spices, aromatic and medicinal crops.

ii. Research:

- To conduct systematic research on crop improvement in cahew, turmeric, ginger, seed spices (Fennel, fenugreek, coriander, ajwain etc.) for their high yield, quality and resistant/ tolerant to biotic and abiotic stresses under eastern dry zone.
- Standardization of agro-techniques viz., INM, cropping systems, fertigation, PHT and value addition of PSMAC.
- Identification/developing of suitable quick method of multiplication techniques for mass production planting materials (seeds, cuttings, grafting, layering, budding and micropropagation)
- Identification of suitable rootstocks for dwarfness, problematic soils, drought tolerance and abiotic tolerance.
- Developing suitable crop consortiums to boost up yield for individual crops through management of macro and micro nutrients.
- Developing suitable package of practice for organic cultivation of spices, medicinal and aromatic crops.
- Developing suitable Hi-tech horticulture in relation to polyhouse and shade net cultivation of turmeric, ginger, seed spices, medicinal and aromatic crops.
- Standardization of postharvest technology and value addition for turmeric, ginger, seed spices, medicinal and aromatic crops.
- Initiation of molecular studies in crop improvement and quality analysis of products.
- Validation of ITK's existing in plantation, spices, medicinal and aromatic crops.

iii. Extension:

- Skill oriented hands on training to master's and doctoral students.
- Impart consultancy services to industrial entrepreneurs, farmers and extension functionaries.
- Conducting ELP and farm trials for the new technologies developed.

Statistics of Ph.D programme (2013-14 to 2017-18)

Department was involved in offering courses to the Ph.D (Hort.) students from 2010 but it was in general horticulture. The department is offering Ph.D in Plantation, Spices, Medicinal and Aromatic crops from the academic year 2016-17.

Sl. No.	No. of PG recognized teachers	Academic year	Intake of Students				Degree awarded during the year
			Ph.D.	Boys	Girls	Total	
1.	2	2013-14	-	-	-	-	
2.	2	2014-15	-	-	-	-	
3.	3	2015-16	-	-	-	-	
4.	2	2016-17	02	02	-	02	Yet to complete
5.	2	2017-18	06	05	01	06	Yet to complete
6.	4	2018-19	03	02	01	03	Yet to complete
Total			11	09	02	11	

Gold Medals received by the Ph.D (PMA) students

Year	Ph.D. (PMA)
2013-14	-
2014-15	-
2015-16	-
2016-17	-
2017-18	-

Fellowships/ Scholarships Ph.D (Hort.) PMA students

Scholarship Type	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Merit Scholarship	-	-	-	-	-	-
Students Aid fund	-	-	-	-	-	-
Category I EBL Scholarship	-	-	-	-	-	-
SC/ST Fellow Ship	-	-	-	-	1	1
GOI Scholarship (SC+ST)	-	-	-	-	-	-
Vidyasiri food & Accommodation	-	-	-	-	2	-
SRF	-	-	-	1	1	-
GoK	-	-	-	-	-	1
Total	0	0	0	1	4	2

6.4.2. FACULTY STRENGTH

Sl. No.	Cadre	Sanctioned strength	Faculty in place	Vacant position	Faculty recom. By ICAR	Deviations from ICAR recom.
1.	Professor	-	1	-	-	-
2.	Asso. Professor	-	-	-	-	-
3.	Asst. Professor	-	1	1	-	-
4.	Emeritus Professor sanctioned by ICAR	1	1	-	-	-
5.	Emeritus Scientist sanctioned by ICAR	1	1	-	-	-

6.4.3. TECHNICAL AND SUPPORTING STAFF

Sl.No.	Designation	Sanctioned strength	Faculty in place	Vacant position	Faculty recom. By ICAR	Deviations from ICAR recom.
1	Lab Assistant	-	01	-	-	-
2	Field Assistant	-	01	-	-	-

6.4.4 CLASS ROOMS AND LABORATORIES

Sl.No.	Class room No.	Area	Seating capacity	Other facilities (LED projector, Computer etc.)
1.	Ph D. Class room 01	150 square meter	30	LCD projector, Computer
2	Ph D Lab 01	150 square meter	30	LCD projector, Computer and

* Common seminar hall for all the departments.

Major equipment

Sl. No.	Name of the equipment	Quantity	Cost of the equipment (Rs.)	Present condition (functional or non functional)
1	Precision balance (0.1 mg)	1no	99,042	Working
2	Clevenger's Apparatus 5 kg Capacity	3 no's	99,100	Working
3	Automatic Solvent Extraction system with Accessories	1no	1,32,701	Working
4	Field weighing scale 50 Kg capacity	1no	5,153	Working

5	Weighing scale for lab 1 and 5 kg capacity	1no	9,123	Working
6	Refrigerator	1no	30,572	Working
7	pH meter	1no	41,846	Working
8	Vacuum pump	1no	34,068	Working
9	Constant temperature water bath	1no	40,304	Working
10	Spectrophotometer	1no	3,60,000	Working
11	RO based water distillation units	1no	93604	Working
12	Digital camera	1no	59950	Working
13	Induction stove	2nos	7470	Working
14	Water circulator	1no	62,920	Working
15	Strainer/filter/sorter	1no	10326	Working
16	Leaf area meter with software and motorized conveyor	1no	3,09,250	Working
17	Refrigerated centrifuge	1no	3,91,724	Working
18	Incubator/ Germinator of capacity 200 litres	1no	1,79,000	Working
19	Hot air oven of size 60×60×60 –	1no	63,000	Working
20	Rotary vacuum evaporator	1no	99,501	Working
21	Micro oven	1no	16,603	Working
22	Willey mill	1no	51,525	Working
23	Digital moisture meter	1no	1,25,000	Working
24	Microwave oven	1no	14,500	Working
25	Refrigeration circulation bath	1no	28,000	Working
26	Precision water bath	1no	-	Working
27	Freezer (-86 degree)	1no	4,14,286	Working
28	Rotovapor	1no	3,78,235	Working
29	Projector, Screen, Mounting kit & laser pointer	1no	54,953	Working
30	Sonicator	1no	1,95,142	Working
31	Autoclave	1no	1,10,000	Working

Farm facilities

Sl. No.	Name of the Department	Farm Area	Irrigated / Non-irrigated	Crops grown
1	PSMA	10 acres	Irrigated and Non-irrigated	Demo block(2.5acres) , major plantation , spice medicinal and aromatic crops, Research block(Coffee, oil palm, Rubber,

				coconut, areca nut, pepper, cinnamon, cardamom, nutmeg, all spice all medicinal and aromatic crops which are there in the UG and PG course curriculum)
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Apart from this we have 750 square meter area of shade net and 500 sq meter area of poly house utilised for propagation and hardening of plants.

P.G research facility availability: Five acre is meant especially for PG student research. Research facilities like inputs (Seeds, fertilizers, irrigation and pesticides) farm pond and drip irrigation network and contractual s workforce required for conducting PG research.

Workshops if any: Nil

6.4. 5.CONDUCT OF PRACTICAL AND HANDS ON TRAINING

Sl. No.	Department	Method of hands-on-training
1	PSMAC	<ul style="list-style-type: none"> • Different distillation methods(Hydro, hydro steam and steam distillation) • Propagation techniques for medicinal and aromatic crops • Quality analysis(Acid value , saponification value, vacuum distillation, dry distillation, soxlet extraction, Rotavator) • Grading and sorting • Leaf area meter with software and motorized conveyor Willy mill(powdering the material) • Digital moisture meter • Production technology • Growth regulator preparation • Seed treatment methodology • Precision water bath • Spectro photometer • Centrifuge

Note: Clearly mention about how the hands-on-training is being imparted to the students as per course curricula for different courses

Students starting from beginning they will be oriented and made acquainted about the procedures and protocols to learn operation of several instrumentations to meet the challenges when they enter the industry/ research institutes. Apart from this other department instrumentation usage will be learnt by visiting the labs of different institutes where we have MOU viz., UAS, Bangalore, IIHR, Hesarghatta, CIMAP Bangalore, FRLHT, Bangalore and CFTRI, Mysore where the students will be oriented and have hands on experience about the facilities and instrumentation where we don't have in our institute but they are part of the

course curriculum. The students are also exposed to different PSMAC institutes, fields and research facilities other than Bengaluru to enrich both lab and field research in relation to plantation, spices, medicinal and aromatic crops (ex: CPCRI, IISR, UPASI, TNAU, KAU, CCRI etc by arranging study tour.)

6.4.6.SUPERVISION OF STUDENTS IN PG/PH.D. PROGRAMMES

Every student shall have Advisory Committee with a Major Advisor and at least four members among whom two members shall be from outside the major field of specialization. Advisory Committee for MSc student shall consist of at least five members of whom three are from outside the major field of specialization. Programme of Research proposed by the Advisory Committee and approved by the Dean (Post Graduate Studies) will be carried out by the student under the supervision of Advisory Committee. Totally 11 PhD students have enrolled and yet to pass out from the Department of PMA, College of Horticulture, Bangalore from 2013 to 2018.

Faculty strength at COH, Bengaluru

Sl. No.	No. of PG recognized teachers	Academic year	Intake of Students
			M.Sc.
1.	2	2013-14	-
2	2	2014-15	-
3.	3	2015-16	-
4.	2	2016-17	02
5.	2	2017-18	06
6.	2+2*=4	2018-19	03

* Emeritus Professor sanctioned by ICAR

Faculty working in nearest institutions like IIHR, CIMAP and CPCRI are involved to guide the students

Short Note on Sufficiency of staff and how the shortage of faculty is taken care

For post-graduation degree programme every semester five M.Sc. courses are being offered. The faculty present in Department (02 Asst. Professors) are handling courses along with under graduate and diploma courses. Emeritus Professor sanctioned by ICAR also involved in teaching and research. If any shortage of faculty for handling the courses the PG

recognized teachers from nearest stations and institutes like IIHR, CIMAP are also involved for the handling the courses.

Present intake of Ph.D students for the year 2018-19

Sl. No.	Name of the Department	No. of PG recognised teachers	Intake of students	Student to teacher ratio
1	PSMAC (M. Sc.) 2018	02	04	1:2

Shortage of faculty exists, temporary faculty on contract basis is hired for teaching, retired professors from UAS Bangalore, IIHR Emeritus professors are being involved to offer teaching and for research, students will be allotted to nearby institutes like IIHR, IISR and CIMAP Bangalore to guide the students apart from university PG recognized teachers.

6.4. 7.FEEDBACK

Sl.No.	Particulars	Year	Important remarks/feed back
1.	PhD students	2014	-
		2015	-
		2016	Practical exposure was nice. Teaching and research was excellent.
		2017	Field and lab facilities in the department are good. Exposure was excellent.
		2018	Teaching and research facility is good. Need more financial assistance to research rather dependence from nearby institutes for few studies.
2	Farmers	2016-2018	Good collection and availability of genuine planting materials of Medicinal and Aromatic crops, Updated Knowledge on Plantation and Spice crops. Good extension work in terms of field days, technology demonstrations, seed treatment campaigns and training programmes. Good facility for pilot scale works like distillation of essential oil, good seed spices production technology standardized

6.4. 8. PRESENT INTAKE OF M.SC AND PH.D STUDENTS FOR THE YEAR 2018-19

Sl. No.	Name of the Department	No. of PG recognised teachers	Intake of students	Student to teacher ratio
1	PSMAC (M. Sc.)	02	04	6.5:1
2	PSMAC (Ph. D.)	02	09	

Shortage of faculty exists, temporary faculty on contract basis is hired for teaching, retired professors from UAS Bangalore, IIHR Emeritus professors are being involved to offer teaching and for research students will be allotted to nearby institutes like IIHR and CIMAP Bangalore to guide the students apart from university PG recognized teachers.

6.4.9. ICT APPLICATION AND CURRICULA

ICT enabled teaching-learning encompasses a variety of techniques, tools, content and resources aimed at improving the quality and efficiency of the teaching-learning process. At CoH, Bangalore for effective teaching and learning, teachers participate in selection and critical evaluation of digital content and resources. For this each individual staff allotted with high configured computer system and connected with high speed Internet facilities for sharing digital contents.

Below mentioned ICT facilities established in the college are being utilized for PG programme at Department of Plantation, Spices, and Medicinal and Aromatic crops

S.No.	Name of Lab	Equipment	Usage
1	ICT Enabled Lab + Class Room	LCD projector-1	For educational video, PPT, conferencing , teaching and learning
2	PG -Computer	Computer with printer -1	For research work
3	Analytical lab	Spectrophotometry equipped with other physical analysis equipments	Essential oil quality analysis
4	Essential oil Distillation lab	Hydro-distillation, hydro-steam distillation, steam distillation and solvent extraction.	Extraction of various aromatic plants
5	Lab (both UG & PG)	Seed, crude drugs and other samples of PMA	Exhibits of various practical samples of the PMA crops

Library:- Digitalized college library: KOHA, CeRA, e- books, e-Journals, Krishikosh
The KoHA (library management): Open wear software is implemented to automate the library activities. The charging and discharging of documents is automated and e-mail reminder facility has been introduced.

CeRA and other online e-resources: CeRA is the ICAR Consortium of e-resources in Agriculture. This covers more than 3500 scholarly journals pertaining to the Agriculture and allied sciences which are available in full text.

e - books & e - journals : Library is having access to Springer e-books for the copy right years 2014-16, which covers nearly 1900 books in virtual format with full text availability and at a time 25 users can open an e-book. In addition library has access to 200 Indian e-books and also library having excess to e-journals for Hortsci and Journal of American society for Horticulture Science.

Krishikosh: Krishikosh is database of thesis submitted to the Agriculture universities and ICAR institutions. The UHS Library is a member for Krishikosh and all the thesis submitted to the UHS are being uploaded regularly.

Internet: The library is provided with separate internet link line with speed of 100mbps. There is a separate digital library section made in the library which is equipped with 05 computers with facility of internet connected to all computers.

Wi-fi facility: Wi-fi is available in the library premises. One can have net facility in the campus through IP based network. Through which students and faculty members can browse CeRA and e-resources of the library and college premises.

Different ICT Software's used by PG students at COH Bengaluru


S. No	ICT Application	Usage
1	Academic Management System Software	Online PG Student Admission, POW , POR, Thesis Submission, Qualifying Examination etc. Complete activities of Student, Staff, Academic section activities, automated in this software
2	Horti App	Provide information about the horticulture trends, technologies and methods being used. HortiApp is a useful app in cultivation of all kinds of crops, where it gives detailed information of each crop.
3	SYSTAT	Statistical Software for analysis of Statistical Data
4	Window STAT	Statistical Software for analysis of Statistical Data
5	HERBIQ	Windows Form Application that stores data in encrypted XML files to track the progress of plants, nutrient levels, environment, smoke effects, strain characteristics for breeding, etc. Output to single file with embedded images like a pdf file or some open format to show others

6.4.12.

CERTIFICATE

I the Dean, College of Horticulture, Bengaluru hereby certify that the information contained in the Section 6.4.1 to 6.4.9 are furnished as per the records available in the college and degree awarding university.

Date: March, 2019



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