

# PANTNAGAR BIOTECHNOLOGY PROGRAMME

(30 Years of Quality Biotech Education & Research)

DEPARTMENT OF MOLECULAR BIOLOGY & GENETIC ENGINEERING

COLLEGE OF BASIC SCIENCES & HUMANITIES

G.B. PANT UNIVERSITY OF AGRICULTURE & TECHNOLOGY

PANTNAGAR - 263 145, DIST. UDHAM SINGH NAGAR

UTTARAKHAND, INDIA



Dr. Anil Kumar  
Coordinator & HOD


No. CBSH/MBGE/ 1889  
Dated: ... 22/12/2019

Dear Sir,

This is with reference to your letter No. MU/Academics/ Ph.D. Evaluation/2017-18/ 006 dated 25 July, 2017 regarding evaluation report of Doctoral Thesis entitled "Phytochemical Studies of Selected Medicinal Plants for their Biological Activity", submitted by Mrs. Shipra Shukla, Research Scholar, Department of Biotechnology and Life Sciences, Institute of Biomedical Education and Research, Mangalayatan University. Kindly find enclosed herewith evaluation report and Honorarium Bill along with thesis for your kind perusal and necessary action, please.

With regards,

Dy. Registrar (Academics)  
33<sup>rd</sup> Km Milestone Aligarh  
Mathura Highway, PO: Beswan  
Aligarh- 202 145, U.P.

  
(Anil Kumar)  
Professor & Head  
Dept. of Mol. Biol. & Genetic Engg.  
College of Basic Sciences & Humanities  
GB Pant University of Agriculture & Technology  
Pantnagar - 263145  
Distt. - U.S. Nagar (Uttarakhand)

Encl: As above.

# Mangalayatan University, Aligarh

REPORT on Ph. D Thesis/Dissertations

1. Name of the Scholar/Regn. No. SHIPRA SHUKLA 20111106
2. Title of Thesis PHYTOCHEMICAL STUDIES OF SELECTED MEDICINAL PLANTS FOR THEIR BIOLOGICAL ACTIVITY

## IMPORTANT

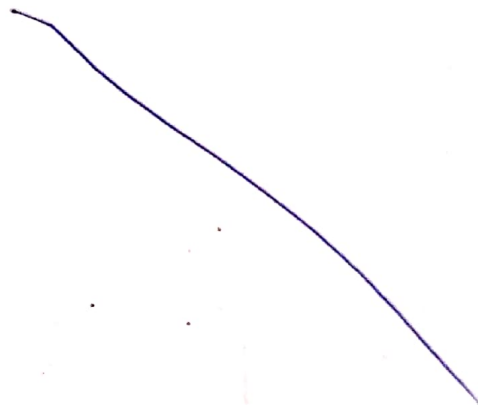
The examiner is requested to send his/her report/recommendation under the following heads:-

1. General and critical appreciation of the thesis:

Pl see attached sheet


2. Positive aspects of the thesis indicating the good points therein:

Please see attached sheet.



3. Negative aspects, if any:

Please see the attached sheet



4. Specific recommendation regarding publication of the thesis:

- i) Thesis is fit for publication in its original form.
- ii) Thesis is not fit for publication.
- iii) Thesis is fit for publication only after making following modifications.

5. Recommendations

I (a) Whether the thesis is a piece of research work characterized either by discovery of new facts

OR

Enunciation of a new theory,

OR

By fresh interpretation of known facts or theories,

(a) By fresh interpretation of known facts or theories except the new selection of plants in the study of

(b) Whether the thesis evinces candidates capacity for critical analysis/examination and judgment so far as its literary presentation is concerned.

(b) Yes, .....

II The Evaluator will state categorically whether in his or her opinion

(a) Thesis should be accepted for the award of Ph.D. Degree.

OR

(b) It should be referred back to the Candidate for presenting it again in revised form:

OR

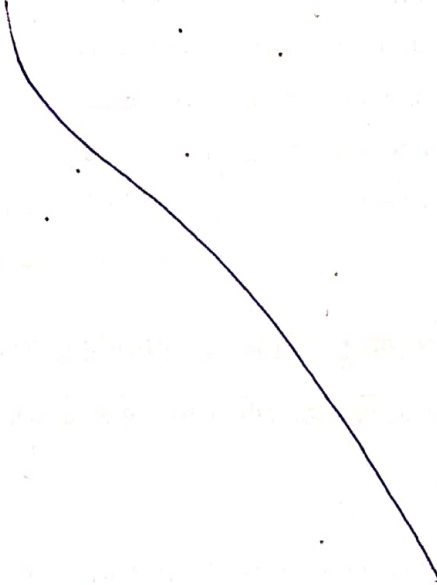
a) Thesis should be accepted for the award of Ph.D. degree.

(c) It should be rejected.



6. Question for Viva (at least six questions may be given)

Please see the attached sheet



(Signature of the Examiner)

Name .. Anil Kumar .....

Address .. Prof. A. Head .....

Dept. of Mol. Biol. & Genetic

Engg. CBSH, G B Pant

Univ. of Bari & Fed Pathways

Phone No ..... 9411195450 .....

Mobile ..... 05944-233898 .....

Note: - [If necessary, blank sheets may be added to complete the report under any particular head(s) above.]

# Mangalaytan University, Aligarh

## EVALUATION REPORT OF THE THESIS

Name of the Student : Shipra Shukla  
Degree Sought : Ph.D.  
Subject : Biotechnology  
Thesis Title : Phytochemical studies of selected medicinal plants for their biological activity.

### 1. General and critical appreciation of thesis:

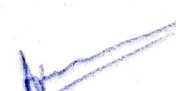
The present work elucidated the antioxidant, antimicrobial and anticancer potential of stem, root and leaf extracts of the plants *Cassia tora*, *Betula utilis*, *Justica adhatoda* and *Sonchus arvensis*. Further, detailed phytochemical analysis was carried out to determine the phenolic and flavonoid content of the extracts which was correlated with the antioxidant potential as calculated by DPPH radical scavenging assay. Diversity in fatty acid composition was determined by GC MS whereas for phenolics it was estimated by UPLC MS/MS. The effect of influence of climate on chemical composition of extracts was assessed as well.

### 2. Positive aspects of the thesis indicating good points therein:

The thesis work carried out was able to justify the objectives quoted in a good sequential manner. Further details are given as per-

#### *1. Technical Comments on*

- A. **Review of literature:** The review thoroughly describes the importance of different plants used in the study with ample examples of their antioxidant, antimicrobial, anticarcinogenic and antidiabetic potential.
- B. **Research Techniques & Methodology:** The research techniques and methodology are discussed in a definite sequential way. Different assays such as biochemical assays for assessment of phytochemical composition (TPC, TFC, Fatty acids) and antioxidant potential, MIC determination, cell cytotoxicity assay- MTT assay, GC MS, UPLC MS/MS analysis has been done successfully.
- C. **Research and their reading:** The experiments done and results of the research work can be clearly interpreted. The objectives are designed successfully and their fulfillment leads to step wise conclusive results in a good manner. The conclusion drained from the present study elucidates the antioxidant, antimicrobial and anticarcinogenic potential of phytochemicals present in the respective plant species.

  
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ABU University of Agriculture & Technology  
Parbhani - 431 002

Phone - 020-2630100

## 2. Presentation

- A. Clarity of Expression:** The methods used and the outcome as results are both lucid enough for making correct interpretations. Results have been well presented and discussion is quite satisfactory and fulfills the aims of the study.
- B. Tabulations and Summarization:** Tables are neat and summarization has been done in a mannerly order.
- C. Illustrations (Graphics, Histograms, Photographs etc.):** The illustrations confirm the results, hence are vivid and descriptive. Photographs have been well documented and clearly illustrated.

## 3. Negative aspects, if any:


- i) Introduction:** There are many grammatical errors and many sentences need reframing. Corrections have been made with pencil in the hard copy and need serious consideration.
- ii) Review:** Many grammatical are present in the text and need to checked thoroughly. There are many punctuation mistakes as well.
- iii) Objectives and Methodology:** The objectives state evaluation of antidiabetic property of extracts but it has not been evaluated. Further, collection and phytochemical analysis of extracts must be considered in one objective.  
The objectives need to be reframed-
1. Preparation and phytochemical characterization of plant extracts/fractions utilizing biochemical and chromatographic techniques.
  2. Comparative analysis of phytochemical composition with respect to tissue specific and geographic distribution.
  3. Biological characterization of antimicrobial and anticarcinogenic efficacy of plant extracts/fractions.

### iv) Result and discussion:

1. Statistical analysis in some graphs is missing. It is advised to use two way ANOVA and multiple comparative analysis for determining the significant difference in phytochemical composition among different plant fractions.
2. The biological activity of plant extracts/ fractions with respect to fatty acid and phenolic composition must be discussed in detail and further correlated with antimicrobial and anticarcinogenic efficacy.


## 6. Questions for viva (at least six questions may be given):

1. State the rationale for the selection of plants used for the study conducted?

  
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15 Barshi, Pune-411 004, Maharashtra, India



2. How does tissue specific distribution influence the content of phytochemicals?
3. What climatic/geographic factors influence the phytochemical composition and how can this difference be utilized for our benefit?
4. State the rationale for the study of fatty acid composition. Further, explain its role in antimicrobial and anticarcinogenic activity?
5. Of all the selected plant samples from different geographic regions which geographic region showed maximum diversity and rich content of phytoconstituents? Why was DART MS not selected for metabolite comparison in real time?
6. State the future prospects and scope of the study and how can it benefit mankind?

  
(Signature of Examiner)

**Name: Dr. Anil Kumar**

**Address:** Professor and Head,  
Dept. of Molecular Biology and Genetic  
Engineering,  
College of Basic Sciences and Humanities,  
GBPUA&T, Pantnagar  
US Nagar, Uttarakhand-263145  
Phone No. 05944 - 233898  
Mobile No. 7409960028



# Mangalayatan University, Aligarh

REPORT on Ph. D Thesis/Dissertations

- SHIPRA SHUKLA (ENROLMENT NO: 20111106)
1. Name of the Scholar/Regn. No.....
  2. Title of Thesis "PHYTOCHEMICAL STUDIES OF SELECTED MEDICINAL PLANTS FOR THEIR BIOLOGICAL ACTIVITY."

## IMPORTANT

The examiner is requested to send his/her report/recommendation under the following heads:-

### 1. General and critical appreciation of the thesis:

This study is a detailed investigation of biological activity of the extracts of root, stem and leaves of 4 medicinal plants (*Cassia tora*, *Betula utilis*, *Justicia adhatoda* and *Sonchus arvensis*) grown in different geographical regions. The biological efficiency of their active components extracted using five different solvent system, namely, water, ethyl acetate, hexane, chloroform and methanol has been compared in extensive detail.

The study reveals the following:-

- i) Biological activity and pharmaceutical value of the active components isolated is dependent on the geographical area of growth.
- ii) The phytoconstituents extracted depends upon the solvent used for extraction, therefore, the biological activity and medicinal value changes with change in solvent.
- iii) This study has been able to characterize a lot of biological properties of the extracts in details, which includes antimicrobial activities, anti-cancerous activity,  $\alpha$ -amylase inhibition, antioxidant properties.
- iv) Based on the results of this study, further investigations may be carried out to find out how the phytoconstituents found in these four plants selected for this study may be included in our dietary supplements and the medicinal value of the extracts may be further extended for development of pharmaceutical products.

2. Positive aspects of the thesis indicating the good points therein:

The thesis serves as a useful database of information on the biological activities of the different classes of phytoconstituents present in the selected four plants of medicinal value. This study can serve as a platform for further extending the study to use of bioactive compounds isolated from selected plants grown in different geographical locations for developing pharmaceutical products and dietary supplements good for health.

3. Negative aspects, if any:

The research work carried out for the thesis is extensive and the objectives have been completed. There is no negative aspect of this thesis.

Further work required for translation of this research data into pharmaceutical applications is beyond the present scope of this thesis.



4. Specific recommendation regarding publication of the thesis:

- i) Thesis is fit for publication in its original form.
- ii) Thesis is not fit for publication.
- iii) Thesis is fit for publication only after making following modifications.

5. Recommendations

I (a) ✓ Whether the thesis is a piece of research work characterized either by discovery of new facts

OR

Enunciation of a new theory,

OR

By fresh interpretation of known facts or theories,

(a) The thesis is a piece of research work characterized by discovery of new facts.

(b) Whether the thesis evinces candidates capacity for critical analysis/examination and judgment so far as its literary presentation is concerned.

(b) Yes, candidate is capable for critical analysis and judgment of the research data obtained through the thesis.

II The Evaluator will state categorically whether in his or her opinion

✓ (a) Thesis should be accepted for the award of Ph.D. Degree.

OR

(b) It should be referred back to the Candidate for presenting it again in revised form:

OR

(c) It should be rejected.

Thesis should be accepted for the award of Ph.D. degree.



6. Question for Viva (at least six questions may be given)

i) Is there a selective toxicity on the cancerous cells?

ii) What is the effect of these phyto-extracts on normal human cell lines? Does it show any toxicity for normal cell lines?

iii) How would you examine whether a specific biological activity observed is due to the action of a particular phenol or flavonoid or fatty acid or the combined action of either all phenols or all flavonoids or all fatty acids extracted?

iv) How can you plan this work for further translation of the data obtained into development of pharmaceutical products or dietary supplements?

v) Objective of your study states screening of different solvent extracts for various biological activities i.e. antimicrobials, antioxidant, antidiabetic and anticancerous activities. Please summarize the best biological activities observed for the above 4 phyto-extracts.

vi) After completion of your thesis, where do you feel you can further improve this work?

Tulika Prasad  
12/8/2017

(Signature of the Examiner)

Name DR. TULIKA PRASAD

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AIRF, JNU, New Delhi

Pin - 110067

(JNU New Campus)

Phone No. +91-11-26738836

Mobile +91-9810462955

Note: - [If necessary, blank sheets may be added to complete the report under any particular head(s) above.]



**For the ease of reading the comments, the following is in printed format:**

**General and critical appreciation of the thesis:**

This study is a detailed investigation of the biological activity of the extracts of root, stem and leaves of 4 medicinal plants (*Cassia tora*, *Betula utilis*, *Justicia adhatoda* and *Sonchus arvensis*) grown in different geographical regions. The biological efficiency of their active components extracted using five different solvent system, namely, water, ethyl acetate, hexane, chloroform, ethanol and methanol has been compared in extensive detail.

The study reveals the following:

- i) Biological activity and pharmaceutical value of the active components isolated is dependent on the geographical area of growth.
- ii) The phytoconstituents extracted depends upon the solvent used for extraction, therefore, the biological activity and medicinal value changes with change in solvent.
- iii) This study has been able to characterize a lot of biological properties of the extracts in details which includes antimicrobial activities, anti-cancerous activity,  $\alpha$ -amylase inhibition, antioxidant properties.
- iv) Based on the results of this study, further investigations may be carried out to find out how the phytoconstituents found in these four plants selected for this study may be included in our dietary supplements and the medicinal value of the extracts may be further extended for development of pharmaceutical products.

**Positive aspects of the thesis indicating the good points therein:**

The thesis serves as a useful database of information on the biological activities of the different classes of phytoconstituents present in the selected four plants of medicinal value. This study can provide a platform for further extending the study to use of bioactive compounds isolated from selected plants, grown in different geographical locations for developing pharmaceutical products and dietary supplements good for health.

**Negative aspects, if any:**

The research work carried out for this thesis is extensive and the objectives proposed have been completed. There is no negative aspect of this thesis. Further work required for translation of this research data into pharmaceutical applications is beyond the present scope of this thesis.

### Questions for viva:

- i) Is there a selective toxicity on the cancerous cells?
- ii) What is the effect of these phyto-extracts on normal human cell lines? Does it show any toxicity for normal cell lines?
- iii) How would you examine whether a specific biological activity observed is due to the action of a particular phenol or flavonoid or fatty acid or the combined action of either all phenols or all flavonoids or all fatty acids extracted?
- iv) How can you plan this work for further translation of the data obtained into development of pharmaceutical products or dietary supplements?
- v) Objective of your study states screening of different solvent extracts for various biological activities i.e. antimicrobials, antioxidant, antidiabetic and anticancerous activities. Please summarize the best biological activities observed for the above 4 phyto-extracts.
- vi) After completion of your thesis, where do you feel you can further improve this work?

**Name of Examiner:** Dr. Tulika Prasad

**Address:** Tulika Prasad, Ph.D.

Assistant Professor

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