THESIS FORMAT GUIDELINES

2023

FCRI

FOREST COLLEGE AND RESEARCH INSTITUTE HYDERABAD AT MULUGU
MULUGU (V) SIDDIPET (D) TELANGANA STATE-502279

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FOREWORD

Forest College and Research Institute, Hyderabad at Mulugu is offering Post Graduate Courses in the Faculties of Forestry _____ present day requirements of Forestry education, research and extension. During their programme, students should document their research findings and present their findings in a manner consistent with publications in journals or books. The thesis should reveal the student's ability to analyse, interpret and synthesize information; acknowledge prior scholarly publications in related aspects; describe the methods and procedures used; present results in a sequential and logical manner; and display the student's ability to discuss fully and coherently the meaning of the results. The University felt it is necessary to bring out the updated thesis guidelines to guide the post graduate students in writing theirdissertation.

I am confident that this publication will be more useful to the students during the preparation of their theses. I congratulate the Dean of Post Graduate Studies and the committee constituted for this purpose on updating the thesis guidelines of the FCRI with all the amendments and bringing out in book form.

Date: 00.00.2022 (Smt Priyankaa Varghese)

THESIS FORMAT GUIDELINES

These guidelines are to be followed carefully.

In case of any deviation, the thesis shall be returned to the student for resubmission after necessary revision.

1. GENERAL

The guidelines deal with the presentation of a thesis and similar documents which fall within the definition of the term "Thesis".

1.1 Definition: For the purpose of these guidelines, a thesis or a dissertation is a statement of investigation or research presenting the author's findings and any conclusions reached, submitted by the author in support of his/ her candidature for a higher degree, professional qualification or other award.

A Ph.D thesis must demonstrate the originality and ability of the student for an independent investigation and the results of the research must constitute a contribution to knowledge. The thesis must exhibit the students' mastery over the literature on the subject and familiarity with its sources.

A M.Sc. thesis must demonstrate the student's familiarity with the tools of research, scholarly analysis in their major field and ability to present the results of their investigationeffectively.

1.2 Copyright: The University shall reserve the right to make available or to allow the thesis to be copied in whole or in part without any reference to the author for study and reference purposes subject to normal conditions of acknowledgement. In all other cases, the copyright rests with the author.

1.3 Publication of the Thesis: Whenever any material from the thesis is published, a footnote shall always be given stating that the thesis has been submitted for a Post-Graduate degree of the University.

1.4 Submission of the Thesis: The thesis shall first be submitted in a paper- bound form (green color for Forestry faculty, and yellow for Home Science faculty) and after the viva-voce it shall be hard bound in maroon colors with embossing in golden letters and submitted as per the guidelines. No substitute covers and colors shall be used.

1.5 Number of Copies: The hard-bound thesis shall be submitted in **quadruplicate** (four copies) along with CDs in PDF format, of which one each shall be kept available in Central Library, Campus Library and Department Library and with the Chairperson.

2 PARTS AND ARRANGEMENT

The thesis should normally consist of various sections viz., (1) Preliminaries (2) Text and (3) End matter. The names of these parts are only to facilitate the arrangement of various sections and they are not to be indicated as headings. Chapter dividers shall be avoided. The sections falling under each of the parts are arranged in the thesis in the following sequence:

2.1 Preliminaries:

Title page
Declaration
Certificates
Acknowledgments
List of contents
List of tables (if any)
List of illustrations (if any)
List of symbols and abbreviations
Abstract

2.2 Text:

Introduction
Review of literature
Material and Methods
Results and Discussion
Summary and Conclusions

2.3 End matter

Literature cited

Appendices

3 COVER

3.1 Binding: The thesis shall be fully rexin bound within boards of sufficient rigidity tosupport the weight when placed on the shelf in the maroon navy blue color (as specified at 1.4). The leaves of the thesis shall be permanently secured tothe cover by sewing, in such a way that the leaves can be turned easily and the text clearlyread up to the extreme left margin. Materials like maps, oversized charts, computer printouts, etc., shall be reduced in size by xeroxing. Guards in the form of butter paper for plates, if any, should be provided.

3.2 Cover Title: The outside front board shall bear the title of the thesis in 24 point type in Times New Roman font. The title shall be in upper case with bold letters except scientific names. Scientific names shall be in italics with first alphabet of genus in upper case. The title shall spell out acronyms, abbreviations and symbols. The initials and name (24 point type in bold) of the candidate (as registered at the time of PG admission) with highest qualification (16 point type in bold), the degree (18 point type in bold) and discipline (16point type in bold) for which the thesis submitted, the University emblem (2.5 cm diameter) and the year (24 point type in bold) of submission shall be given as depicted in Appendix-A. The cover material shall be clear of any other lettering.

3.3 Spine Title: The spine of thesis shall bear in at least 24 point type, name, degree and yearof submission. The printing on the spine shall be along the length side when the volumeis lying flat.

4 PAPER, TYPOGRAPHICAL DETAILS AND MECHANICAL CONVENTIONS

4.1 Paper: white bond paper of A4 size (210 x 297 mm) should be used.

4.2 Typing: Type characters shall not be less than 12 point with Times New Roman font. However, subscript, superscript and if essential, tables shall not be less than 8 point type in Times New Roman font. Typing should be of even quality with clear black characters. Copies produced by Xerox or comparably permanent process are acceptable. Only one side of the paper shall be used.

4.3 Margins: The left side margin shall be 4 cm wide and the top, bottom and right side margins shallbe 2 cm wide.

4.4 Spacing: A spacing of 1.5 lines shall be used in type script except for quotations of footnotes where single line spacing can be used. Spacing in abstract shall be in single line space.

Pagination:

Preliminary Pages: These shall be numbered with lower case Roman numerals i.e. i, i,iii, iv, v, vi, etc. at the bottom centre of the page.

Text: The text pages shall be numbered with Indo Arabic numerals consecutively throughout the thesis including the appendices, photographs, diagrams, etc. at the bottom right corner of the page at final submission.

Position of Page Numbers: Page numbers shall be located at the **lower** corner of the page approximately 2 cm from the right edge. Page numbers shall be given without a period or brackets. For pages with landscape setup, the page numbers shall be indicatedin the same position as all other page numbers in the main body of the thesis (vertical when bound as depicted in Appendix-B).

Chapter Heading (First level heading): Every chapter in body of the manuscript shall begin with a new page. Chapter should be numbered with Roman numerals and the chapter heading shall be placed in capitals with 20 point in Times New Roman font. It should be centred on five 1.5 line spaces below the top edge of the page.

Chapter Title: The chapter shall have title with 18 point in Times New Roman font and must be centred at 1.5 space below the chapter heading, capitalized throughout.

Paragraphs: The text should begin with two 1.5 space lines below the chapter title. A paragraph indention of eight spaces shall be used. Subsequent pages of the text should begin 2 cm below from the top of the page. No page should end with the beginning of a paragraph from the previous page i.e. less than one full line in length.

Sub-heading within chapters: Theoretically any number of sub-heading levels are possible, but in practice more than three levels are confusing. All sub-headings and numbers shall have left alignment.

Centre Heading (Second level heading): This heading shall be in bold capitals and placed at 1.5 space below the last line of the previous section with 18 point in Times New Roman font. The text following this heading should appear in regular paragraph form. The heading preceded by the number shall be typed flush with the left margin.

Side Heading (Third level heading): This heading in bold shall be placed at 1.5 space below the last line of the previous section with 14 point in Times New Roman font. Initial letters of words except articles and prepositions (other than at the beginning) should be in capital: The text following this heading should appear in regular paragraph form. The heading preceded by the number shall be typed flush with the left margin.

Run-on-Heading (Fourth level heading or paragraph heading): The initial letters of the words except for articles, conjunctions and prepositions should be in capital. The heading should be preceded by the number in bold with 12 point in Times New Roman font. It must be followed by a colon and the text should follow immediately on the same line.

Numbering of Divisions: The structural elements (Headings) shall be numbered as 1, 2, 3 and subdivided as 1.1, 1.2, 2.1, 2.2, etc. Further sub divisions may be as 1.1.1, 1.2.1, etc. Only Arabic numerals shall be used. A full stop shall be placed between numbers designating subdivisions of different levels. At the end, no full stop shall be placed.

Mechanical Conventions: The conventions listed in the CBE (Commander of the Order of the British Empire) Style Manual (1972) should be followed for punctuations: full stop, ellipsis, comma, semicolon, question mark, numbering, illustrations, diagrams, etc.

Decoration: No ornamentation or bordering of the sides shall be permitted.

5 WRITING THE THESIS

5.1 Style of Writing: The thesis should be written in the past tense, passive voice and in the third person. The guidelines given by the CBE (Commander of the Order of the British Empire) Style Manual should be followed. For referral purpose, the latest Webster's New International Dictionary should be followed.

5.2 Transliteration:

When quotations, authors names, and titles of works have originally appeared in a non-Roman alphabet, the information should be transliterated into Roman alphabet for use within the text.

5.3 Illustrations: Illustrations should immediately follow the textual reference on the following page. They shall be numbered chapter wise. For example, the second figure in chapter Ill shall bear the number as Figure 3.2. The caption shall be placed at the bottom of the figures with the initial letter in capital and shall maintain a single space separating the figure and the caption. The caption should be single spaced closed by a full stop. Photo print or Art paper should be used for printing of photographs. Photographs shall not be pasted directly in the thesis

5.4 Tables: Tables longer than half a page shall be placed on a separate page. Shorter tables should be placed on the page with the text above or below. A table running longer than one page may be continued on two or more pages by indicating the continuation e.g.

Table 3.2 (cont.). The tables shall be numbered chapter wise. For example, the second table in chapter IIl shall bear the number as Table 3.2. The table number shall end with a full stop without any other punctuations both in the text and table title. The title shall be placed above the table following single space separating the table and the title. The first letter of the title is capitalized and single spaced in sentence form. A table is closed with a horizontal line and footnote (if any) pertaining to the table shall be placed below in single line space.

5.4.1 Yield shall be indicated in kg ha^{-1} without any decimals.

5.4.2 In a table, the decimals shall be uniform either one or two or three for all the values.

5.4.3 Certain parameters e.g. Plant height more than 60 cm, Days to 50 % flowering, Daysto maturity shall be rounded to the nearest number.

5.4.4 Citations: In citing works in the text, the following system (author, year) shall be followed. **Similar system shall be followed in the text of synopsis also.**

e.g. cream (1983), Reddy (1985), Sharma (1999)

Alan et al. (2000), Bhan et al. (2000), Geervani et al (1996) Bhan *et. al.* (2000),

(Rao et al. 1979), (Kheterpaul et al.), (Nisar et al. 1992)

(Gill et al. 1986, Ali, 1996, Anderson , 1997 and Yadav and Mallik, 2007)

For the citation of an institutional publication such as Annual Report Committee Report, Statistical Bulletin etc., the organization shall be treated as the author.

e.g. World Health Organization report indicated that in East Pakistan, every dollar invested in malaria control from 1963 to 1966 saved an average of $1.48 in labour and improved health standard (WHO, 1968).

6 PRELIMINARY PAGES

Title page: The title page shall be the first page of the thesis and it should consist of the following statements as depicted in Appendix-D

Title	:	Times New Roman font, bold with 20 point
Author Name	:	Times New Roman font, bold with 16 point
Author's qualification	:	Times New Roman font, bold with 12 point
Submission statement	:	Times New Roman font, bold with 14 point

Degree	: Times New Roman font, bold with 18 point
Discipline in brackets	: Times New Roman font, bold with 14 point
Name of the Chairperson	: Times New Roman font, bold with 14 point
Emblem	: 2.5 cm diameter
Imprint	: Times New Roman font, bold with 14 point

6.1.1Title: The title of the thesis should be self explanatory and give an idea about the contentof the thesis. It shall be placed near the top of the page in capital letters in bold. The sub-title, if any, shall follow the title after a colon in the same line. If the title exceeds one line, an inverted pyramid format shall be followed as far as possible without splitting thewords in each line Appendix-C and D).

6.1.2 Name of the Author: The name of the author in capitals with bold should follow the titlein the upper half of the page preceded by the word 'By' centred in a separate line. The name of the author (as registered at the time of PC admission) shall be given followed byonly the highest academic qualification.

6.1.3 Submission Statement: The submission statement indicating that it is a thesis submitted to the University in partial fulfillment of the requirement of a degree with discipline (to be indicated), shall be placed between the name of the author and the name of the Chairperson.

6.1.4 Name of the Chairperson: The name of the Chairperson in bold capital letters shall follow the submission statement.

6.1.5 Imprint: It should follow the emblem and consist of the Name of the Department and theCollege where the candidate is studying followed by the year of submission. No full-stop shall be used at the end of any statement.

6.2 Certificates of Approval: The Certificates of approval, one by the Chairperson of the Advisory committee (Appendix-D) and the other by the Advisory committee shall be as given in the proforma (Appendix-E for M.Sc. and Appendix-F for Ph.D., respectively).

6.3 List of Contents: The titles of the chapters followed by literature cited and appendices along with page numbers shall be listed in sequence as depicted in Appendix-G.

6.4 List of tables: The list of tables with page numbers shall be given in the order in which they occur in the text. The titles of the tables shall be given exactly as they appear in the text.

6.5 List of Illustrations: The list of illustrations such as photographs, maps graphs, diagrams and statements or depictions with page numbers shall be given in the order in which they occur in the text. The captions of illustrations shall be given exactly as they appear in the text.

6.6 Acknowledgements: Acknowledgements shall be a brief note for technical and financial (institutional only) assistance received by the candidate during his/her research work and preparation of thesis from organizations and individuals. It shall not exceed two pages. It shall not contain nick names and statements of dedication. Acknowledgements for paid services shall be avoided.

6.7 Declaration: The author shall indicate in a declaration, any material contained in the thesis which he/she has used or published before as depicted in Appendix-I and J. If the thesis is based on joint research, the nature and extent of the author's individual contribution shall be indicated.

6.8 Abbreviations: A key to abbreviations and acronyms used shall be provided. For an abbreviation not in common use, the term shall be given in full at first instance followed by the abbreviation in brackets. For the titles of the periodicals, only full title should be given and no abbreviation shall be used.

6.9 Abstract: It shall be written as Abstract in capital letters (in Times New Roman font with 18 point and bold) as depicted in Appendix-K. There shall be an abstract of the thesis in about 500 words in single line space. The abstract shall be preceded by the name of the author, title, degree to which it is submitted and the particulars of faculty, department, chairperson, University and year of submission. The abstract shall be condensed but informative covering the essential points of the investigation. It shall include the nature and scope of the research undertaken, brief methodology of investigation, conclusions and contributions made to the knowledge of the subject treated.

6.10 Dedication: The thesis being a formal presentation for the award of a degree, it shall notbe dedicated to any individual or organization.

7. TEXT

The text of the thesis shall be divided normally into five chapters viz., (1) Introduction (2) Review of Literature (3) Material and Methods (4) Results and Discussion and (5) Summary and Conclusions.

7.1 Introduction: It shall be written as Chapter I (in Times New Roman font with 14 point and bold) followed by Introduction in capital letters (in Times New Roman font with 18 point and bold) as depicted in Appendix K. The introduction should briefly state the lacunae in the subject and the gaps the thesis attempts to fill up. The background and purpose of the investigation should be indicated. The objectives of the investigation shall be clearly mentioned without classifying them as general and specific objectives.

7.2 Review of the Literature: It shall be written as Chapter Il (in Times New Roman font with 14 point and bold) followed by Review of Literature in capital letters (in Times New Roman font with 18 point and bold) as depicted in Appendix-K. The review of

literature shall provide background information to aid the investigator in analysing and formulating the thesis work. The past research findings should be critically examined with reference to the objectives of the investigation. Review of literature shall be up to date and include only those works that have been published, scheduled for publication or deposited in libraries as theses/dissertations. The sources of information are cited by following the Author and Year system as given in 5.5.The model for writing review of literature in PG-3 form i.e., synopsis is presented in Appendix-J.

7.3 Material and Methods: It shall be written as Chapter III (in Times New Roman font with 14 point and bold) followed by Material and Methods in capital letters (in Times New Roman font with 18 point and bold) as depicted in Appendix-K. This chapter should present the techniques, material and methods adopted for conducting the investigation and experiments. The statistical tools adopted for analysing the data shall be mentioned. The Agroeconomic features, descriptions of the study area and company profile for relevant departments shall be included. Methodological limitations or procedural weaknesses, ifany, shall be given. If any improvement or modification of the method over others has been done, it shall be mentioned.

The names of the insecticides, fungicides, herbicides, hormones, chemicals etc., shall begin with capital letter in the beginning of the sentence and thereafter with lower cap only. Trade names however, are to be indicated with capital letter (first letter) either at the beginning of the sentence or any where in the text. Certain crop names are being indicated without uniformity and therefore the crops mentioned below shall be indicated uniformly as Pigeonpea (Redgram), Chickpea (Bengal gram), Cowpea, Greengram, Blackgram, Soybean, Groundnut, Pearl millet, Finger millet etc.

7.4 Results and Discussion: It shall be written as Chapter IV (in Times New Roman font with 14 point and bold) followed by Results and Discussion in capital letters (in Times New Roman font with 18 point and bold) as depicted in Appendix-K. The results should be based on a careful consideration of experimental data. The experimental data should be subjected to appropriate statistical analysis for interpreting the results convincingly. The tables or, illustrations shall have to be considered for drawing conclusions. Data to be presented in tables and illustrations, shall be different from each other. The results shall be interpreted in relation to the reported findings clearly establishing cause-effect relationships. The discussions may include conjecture as to unexpected results, if any. Further, discussion shall be very critical and explicit. The findings are also variously referred to as generalizations, implications, inferences, recommendations for further research, if any.

7.5 Summary and Conclusions: It shall be written as Chapter V (in Times New Roman font with 14 point and bold) followed by Summary and Conclusions in capital letters (in

Times New Roman font with 18 point and bold) as depicted in Appendix-K. This shall be the final chapter of the thesis. A brief report of the work carried out shall form the first part of the chapter. Conclusions derived from logical analysis presented in the results and discussion chapters shall be clearly spelt out. Scope for future work shall be stated lucidly in the last part of the chapter.

8. Literature cited. It shall be written as Literature Cited in capital letters (in Times New Roman font with 18 point and bold) as depicted in Appendix-K. Literature cited shall contain complete reference list, citing all the literature and other sources referred to in the thesis and appendices including websites arranged by the name of the author in alphabetic order as given in the Appendix-M. Individual reference entries shall not be split over two pages. Format and placement of reference citations shall be consistent throughout the thesis. ***Similar system shall be followed in the text of synopsis also***.

The following information will be useful in citation (Literature cited). Whilst there are a number of citation styles, the commonality of presenting citations of different formats as indicated below shall be followed.

In case of an institutional publication the name of the institution or organization shall be treated as the author. No entry will appear as an anonymous publication.

The main parts of a complete entry for a book are (i) Name(s) of author(s), (ii) Year of publication, (iii) Title of book in italics, (iv) Name and city of publishers. (v) Pages referred to in the book. An example is:

Larry P. Pedigo. 1996. *Entomology and Pest Management.* Prentice- Hall of India Pvt. Ltd., New Delhi. 630-635.

Agrawal, R.L. 1980. *Seed Technology*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 165-176.

Dhingra, O.D and Sinclair, J.B. 1995. *Basic Plant Pathology Methods.* CRC Press, London. 212-222.

Sometimes a book does not have a stated author. In such a case, use the title to start the entry. An example is

Facts on File Physics Handbook. 2nd ed.2006. New York, Facts on File Inc. 56

Sometimes books contain essays by a group of people, each author contributing one chapter or essay. (i) Name(s) of author(s), (ii) Year of publication, (iii) Title of the chapter (iv) Author(s) of the book, (v) Title of book in italics, (vi) Name and city of publishers. (vii) Pages referred to in the book. In such case it should be cited as

Parmar, B.S and Walia, S. 2001. Prospects and problems of phytochemical pesticides. In O.Koul and G.S. Dhaliwal (eds.) *Phytochemical Biopesticides*, Harwood Academic Publishers, Amsterdam.133-210.

In case of a chapter in a proceeding:

Power, J.F and Biederbeck, V.O.1991. Role of cover crops in integrated crop production systems. In W.L. Hargrove (ed.) Cover crops for clean water. *Proceedings of International Conference*, Jackson, TN, USA, 9-11 April 1991. Soil and Water Conservation Society, Ankeny, IA.167-174.

The main parts of entry for an article in a periodical are (i) Name(s) of author(s) (ii) Year of publication, (ii) Title of article, (iv) Name of Journal in italics with volume number and pages of the article.

Byrum, J.R and Copeland, L.O.1995. Variability in vigour testing of maize (*Zea mays* L.) seed. *Seed Science and Technology*. 23: 677-688.

Some journals/periodicals will have issue number in addition to volume number. In such of the cases the issue number shall be indicated in parenthesis after the volume number as shown below:

Shelke, V.B., Takale, G.R., Dahiphale, V.V and Shinde, V.S.1987. Effect of sowing dates on growth and yield of groundnut cultivars in *rabi* season. *Journal of Oilseeds Research*. 4 (2): 271-274.

The main parts of entry of a website are (i) Name of the institute, (ii) Title of the article/ information/web page in italics and the URL

American Chemical Society. *Polyvinyl alcohol.*30 April 2007. http:// www.cas.org/motw/ polyvinylalcohol.html.

Note that the title of the web-page should be italicized.

The first line of the references starts from the margin and the subsequent lines continued from the fifth letter (space) of the above line. Each reference is single spaced: a double space should be provided between individual references:

If there are several references with different titles by the same author, the name(s) of the author(s) are to be typed again.

More than one publication of the same author in the same year, a small alphabet shall be mentioned at the year as mentioned below.

Sheldrake, A.R and Narayanan, A. 1979a. Growth, development and nutrient uptake in pigeonpea (*Cajanus cajan* Milsp.). *Journal of Agricultural Sciences*. 92: 513-526.

Sheldrake, A.R and Narayanan, A. 1979b. Pigeonpea (*Cajanus cajan* Milsp.) as winter crop in peninsular India. *Experimental Agriculture*. 15:91- 95.

Likewise the literature cited should follow the format and all the references shall be arranged alphabetically (as shown in Appendix-M) at the end after Summary and Conclusions chapter.

9. SYMBOLS AND ABBREVIATIONS

The International Standards of Symbols and Abbreviations are to be followed as shown in Appendix-N.

10. APPENDICES

Any supporting material not included but referred to in the main text should be given as an appendix. Appendices shall follow the section "Literature Cited." The style of appendices shall be consistent with the style of the main text. If there is more than one, each appendix shall be given alphabetic designation such as appendix A, B, etc. and be titled. The format should follow the rules for chapter titles as shown in Appendix-I.

11. INDEX

The thesis shall not be indexed.

Appendix A: Cover Title

STUDENTSON THE EFFECTIVENESS OF TRICHODERMA VIRIDE PERSOON IN THE CONTROL OF REDGRAM WILT

Table 3.1 Mean values of different characters for 23 safflower genotypes

S.No.	Accession Number	Days to 50% flowering	Plant height (cm)	Diameter of main capitulum (mm)	No. of effective capitula	No. of seeds/ main capitulum	100 seed weight (g)	Hull content (%)	Oil Content (%)	Seed Yield (g)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										

Appendix B: Format for presentation of table in landscape mode

Appendix C: Title page

STUDIES ON _____

Font size 24 Point

16 points M.Sc. (Ag.)

Font size 18 Point

DOCTOR OF IN FORESTRY (GENETICS AND PLANT BREEDING)

Font size 16 Point

2.5 cm diameter

FCRI

2023

Font size 24 Point

APPENDIX D: Title Page

STUDIES ON _____

Font size 20 Point

_____

_____

Font size 16 Point BY

_____ Font size 16 Point

B.Sc. Font size 12 Point

Font size 14 Point

THESIS SUBMITTED TO BE FOREST COLLEGE AND RESEARCH INSTITUTE, HYDERABAD AT MULUGU IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF

Font size 18 Point **MASTER OF SCIENCE IN FORESTRY**

(_____) Font size 14 Point

CHAIRPERSON : _____ Font size 14 Point

2.5 cm diameter

FCRI

DEPARTMENT OF _____

FOREST COLLEGE AND RESEARCH INSTITUTE, HYDERABAD AT MULUGU

Font size 14 Point

Appendix-D: Certificate by chairperson of the Advisory Committee

CERTIFICATE

Mr/Ms…….has satisfactorily prosecuted the course of research and that thesis entitled "…....." submitted is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that neither the thesis nor its part thereof has been previously submitted by him/her for a degree of any University

Date: **Chairperson**

Appendix-E: Certificate of the Advisory Committee for Master Degree

CERTIFICATE

This is to certify that the thesis entitled "…. ....." submitted in partial fulfillment of the requirements for the degree of 'Master of Science in Forestry/ Home Science/Community Science' of the Forest College and Research Institute, Hyderabad at Mulugu is a record of the bonafide original researchwork carried out by Mr./Ms…… under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

Thesis approved by the Student Advisory Committee

Chairperson	Name Designation Address	(Signature)
Member	Name Designation Address	(Signature)
Member	Name Designation Address	(Signature)

Date of final viva-voce:

Appendix-F: Certificate of the Advisory Committee for Ph.D.

CERTIFICATE

This is to certify that the thesis entitled "… ....." submitted in partial fulfillment of the requirements for the degree of 'Doctor of Philosophy in Forestry/ Home Science/Community Science' of the Forest College and Research Institute, Hyderabad at Mulugu is a record of the bonafide original research work carried out by Mr./Ms… under our guidance and supervision.

No part of the thesis has been submitted by the student for any other degree or diploma. The published part and all assistance received during the course of the investigations have been duly acknowledged by the author of the thesis.

Thesis approved by the Student Advisory Committee

Chairperson	Name Designation Address	(Signature)
Member	Name Designation Address	(Signature)
Member	Name Designation Address	(Signature)
Member	Name Designation Address	(Signature)
External- Examiner of Final viva voce	Name Designation Address	(Signature)

Date of final viva-voce:

Appendix-G: List of Contents

LIST OF CONTENTS

Appendix-H: Declaration

DECLARATION

I, ..., hereby declare that the thesis entitled "....." submitted to the Forest College and Research Institute, Hyderabad at Mulugu for the degree of Master of Science in Forestry is the result of original research work done by me. I also declare that no meterial contained in the thesis has been published earlier in any manner.

Place: **(Name of the Student)**

I.D. No.

Date:

Appendix-I: Titles

18 point, caps and bold	**ABSTRACT**
14 point and bold	**Chapter I**
18 point, caps and bold	**INTRODUCTION**
14 point and bold	**Chapter II**
18 point, caps and bold	**REVIEW OF LITERATURE**
14 point and bold	**Chapter III**
18 point, caps and bold	**MATERIAL AND METHODS**
14 point and bold	**Chapter IV**
18 point, caps and bold	**RESULTS AND DISCUSSION**
14 point and bold	**Chapter V**
18 point, caps and bold	**SUMMARY AND CONCLUSIONS**
18 point, caps and bold	**LITERATURE CITED**
18 point, caps and bold	**APPENDICES**

Appendix-J:

Model guidelines for writing brief resume of work in PG-3 form (Synopsis)

BRIEF RESUME OR WORK DONE IN INDIA AND ABROAD.

Han *et al.* (2007) using two transgenic rice cultivars- KF 6 and II You KF 6 expressing *cry 1Ac* toxin and *CpTI* (Cow pea Trypsin Inhibitor) genes reported that the corrected mortalities of the rice leaf folder (RLF) on transgenic lines were > 90 per cent after 48 h and 100 per cent after 96 h of infestation. Further, it was also reported that the dynamics of RLF egg laying and larvae density in the field studies varied greatly among rice varieties during the growing seasons in 2005 and 2006. There was a significant difference in the percentage of plants with folded leaves in control and transgenic plants during the late season of development. The two transgenic lines, KF6 and IIYouKF6, also showed stable efficacy against RLF at all the developmental stages. Significantly less number of adults emerged in cages of KF6 and II You KF6 than those from control treatments with or without insecticide sprays.

Basher *et al.* (2004) reported the evaluation of transgenic basmati rice (B-370) under field conditions. Accordingly, transgenic lines expressing *cry* 1Ac and cry2A toxins showed ten per cent damage against Yellow Stem Borer (YSB) and one per cent damage against RLF without compromising any agronomic characteristic. Though the toxin titer declined substantially in all lines, these two lines still provided resistance against target insect pest at all the stages of plant growth, and persisted well within the limits needed to reduce the target insect pest infestations.

Chen *et al.* (2005) by designing a modified novel *cry* 2A gene on the basis of rice preference codons and introducing it into an elite indica rice restorer line Minghui 63 reported that the *cry* 1Ac transgenic line was completely resistant against lepidopteran pests. *Cry* 2A transgenic lines were 100 % immune to rice stem borers, though four transgenic lines highly resistant against first-instar larvae of yellow stem borer in a laboratory bioassay, indicating that resistance of *cry* 1Acrice is indeed superior to *cry* 2A rice atleast against rice stem borers, and *cry* 2A rice appears to be very effective against rice leaf folder.

Maqbool *et al.* (2001) introduced three insecticidal genes (the *cry* 1Ac and *cry* 2A, and snowdrop lectin gene gna) simultaneously into commercially grown indica rice varieties M7 and Basmati 370, by particle bombardment either singly or in combination. The toxin expression of the introduced genes was of the ranges 0.03-1 % , 0.01-0.5 % and 0.01 2.5 % of total soluble protein. It was reported that the transgenes showed stable transmission and expression, and R 1 transgenic plants provided significant protection against three insect pests, RLF (*Cnaphalocrocis medinalis*), YSB (*Scirpophuga incertulas)* and Brown Planthopper (BPH) Nilaparvata lugens. The triple transformants showed significantly higher resistance than the

single transformants with 100 per cent mortality of the rice leaf folder and yellow stem borer, and reduced the survival of the brown planthopper by 25 per cent.

Intikhab *et al.* (2000) evaluated the responses of various populations of YSB and RLF to purified toxins of *cry* 1Aa, *cry* 1Ab, *cry* 1Ac, *cry* 1C and *cry* 2A toxins and reported that the LC_{50}, values for *cry* 1Aa for RLF ranged from 31.37 ng/ml to 112.58 ng/ml and for *cry* 1Ab, *cry* 1Acand *cry* 2A the values were 16.35-91.67ng/ml, 26.04-50.21 ng/ml and 20.19-178.79 ngml respectively. *cry* 1Cwas the most effective against RLF with LC_{50} of 8.74 ng/ml to 175.13 ng/ml.

Singh *et al.* (2009) evaluated the bioefficacy of native isolates of Bacillus thuringiensis against RLF and reported that out of the 22 isolates only three viz., BtK4, Bt C5 and Bt J showed more than 55 % larval mortality of RLF third instar larvae. Sub lethal effects like increase in the larval and pupal duration were also seen with a considerable decrease in the weights of the larvae and pupae with increase in the concentrations. The maximum larval mortality of 61.88 % was achieved due to Bt K4 isolate.

Karim *et al.* (1999) characterized 17 isolates of Bt from Pakistan by colony and para-sporal inclusion morphology, SDS-PAGE, Western blot analysis to determine LC_{50} values against YSB and RLF. Immunoblotting results showed isolates synthesized entomocidal proteins belonging to *cry* 1A and *cry* 2A toxin groups. The LC_{50}, values of isolates, INS 1.13, INS 2.25 and NW 4.1 that were most potent towards YSB were, 29.83, 30.37, 24.77 ng/ml of toxin and that of isolates INS 2.25 and RL 4.8 that were effective against RLF were 57.37 and 73.09 ng/ml of toxin, respectively.

Han *et al.* (2008) established the baseline susceptibility of RLF to Bt toxins from 10 locations in China and reported that the LC_{50} values for second instar larvae of C mednalis to *cry* 1Ac and *cry* 1Ab were in the range of 3.77-208.22 mg a.i./l and 0.22-7.05 mg.a.i./l respectively. The relative ratios in susceptibility between the most susceptible and most tolerant populations were greater that 50-fold for *cry* 1Ac and 30- fold for *cry* 1Ab.

Using fourth instar larvae of RLF and Marasmia patnalis, collected from different locations of Tamil Nadu the LD_{50} and LD_{95}, values of chlorpyriphos, monocrotophos, phosalone, phosphamidon and quinalphos of the F_1, population of RLF were estimated for evaluating the development of resistance to these insecticides. The LD_{50} values were 0.26377, 0.05165, 0.44345, 1.44641 and 0.06066 mg/larva respectively and the respective LD_{95} values were 1.43704, 0.47195, 2.52836, 7.11030 and 0.53028 mg/ larva. Based on the slope function and increased susceptibility, the common tentative discriminating doses (DD) suggested for *C.medinalis* and *M patralis* were chlorpyriphos 1.00 mg, monocrotophos 0.35 g, phosalone 1.9mg, phosphamidon 5.5 g and quinalphos 0.40 mg (Anbalagan and Regupathy, 2008).

Knowledge of the mechanism of resistance is important in order to prolong the usefulness of commercial products of *Bt*, including transgenic plants expressing Cryproteins. The best-characterized mechanism of resistance is the alteration of binding of Cry proteins to their midgut receptors. Protease mediated activation is the early step in the Cry toxin mode of action. It is a multi step process. Altered proteolysis may affect the rate of change in solubulization of crystals, rate of conversion of protoxin to toxin and further degradation of active toxin to non toxic low molecular weight proteins (Mohan and Gujar, 2003). Some resistant strains of *Plutella interpunctella, P. xylostella,* and *Heliothis virescens* have been shown to have lost or have reduced the capacity of binding *cry* 1A-type proteins. A different mechanism involves alterations in the gut proteinase activities that interact with *Bt* toxins and has been described in many insect pests. Absence of a major gut protease associated with *cry* 1Ac protoxin activation was demonstrated in the 198 colony of *P.interpunctella* (Oppert, 1999), which had been selected with *B.thuringiensis subsp.entomocidus* (HD198) and became resistant to *cry* 1Ab and *cry* 1Ac.

Recent report indicates that resistance to Bt cry toxins is also associated with increased activity of midgut carboxylesterase activity. Hence it is important to monitor if any cross resistance is existing between Bt and synthetic insecticides in larvae of leaf folder. Except for the work of Singh *et al.*(2009) no work has been done on these lines. Hence the work on toxicity of Bt toxins on the establishment of baseline toxicity to *C. medinalis* is initiated.

Appendix-K: Literature cited

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Appendix-N: Symbols and Abbreviations

The following abbreviations shall be used both for singular and plural units

Length

nm	:	Nanometer
µm	:	Micrometer
mm	:	Millimeter
cm	:	Centimeter
dm	:	Decimeter
m	:	Meter
km	:	Kilometer

Mass

ng	:	Nanogram
µg	:	Microgram
mg	:	Milligram
cg	:	Centigram
dg	:	Decigram
g	:	Gram
dcg	:	Decagram
kg	:	Kilogram
t	:	Tonne

Volume

µl	:	Microlitre
ml	:	Millilitre
cl	:	Centilitre
dl	:	Decilitre
l	:	Litre
dkl	:	Dekalitre
hl	:	Hectolitre
kl	:	Kilolitre

Area

mm^2	:	Square millimeter
cm^2	:	Square centimeter
m^2	:	Metre square
km^2	:	Square kilometer

ac	:	Acre
ha	:	Hectare

Pressure

pa	:	Pascal
mPa	:	Mega pascal

Yield and rate

Kg ha^{-1}	:	Kilogram per hectare
1 ha^{-1}	:	Litre per hectare
T ha^{-1}	:	Tonne per hectare
Ms^{-1}	:	Metre per Second
M	:	Million
B	:	Billion
T	:	Trillion

Energy

J	:	Joule
N	:	Newton
Wm^{-2}	:	Watt per square metre

Electrical Conductivity

Sm^{-1}	:	Siemen per metre
dSm^{-1}	:	Decisiemen per metre

Concentration

$Mgkg^{-1}$(ppm)	:	Parts per million or milligram per kilogram
$Emolekg^{-1}$	:	Centimole per kilogram

Plant Nutrient Conversion

P2 O5 x 0.437	:	P
K2Ox0.830	:	K
CaOx0.715	:	Ca
MgOx0.602	:	Mg

Others

%	:	Percent
%C	:	Degree Celsius
et al.	:	and others people
etc.	:	and so on; and other people/things
e.g.	:	for example, for instance

GA	:	Genetic Advance
GAM	:	Genetic Advance as per cent of Mean
GCV	:	Genotypic Co-efficient of Variation
S^2_g	:	Genotypic Variance
H	:	Heritability in Broad sense
No.	:	Number
OD	:	Optical Density
PCV	:	Phenotypic Co-efficient of Variation
S^2_P	:	Phenotypic Variance
Per se	:	As such with Mean
RPM or rpm	:	Revolutions per minute
Viz.,	:	Namely
Vs.	:	Against
a.i	:	Active ingredient
X	:	Grand Mean
SD	:	Standard Deviation
ANOVA	:	Analysis of Variance
CRD	:	Complete Randomized Design
RBD	:	Randomized Block Design
LSD	:	Latin Square Design
DMRT	:	Duncan's Multiple Range Test
SEm	:	Standard Error of mean
CD (P=0.05%):	Critical Difference at 5 percent level	
r	:	Correlation co-efficient
r_g	:	Genotypic correlation co-efficient
r_p	:	Phenotypic correlation co-efficient
R	:	Multiple Linear Refression
R^2	:	Co-efficient of Multiple Determination
MLR	:	Multiple Linear Refression
PCA	:	Principal Components Analysis
H_0	:	Null Hypothesis
H_1	:	Alternate Hypothesis

A.M	:	Before noon
P.M	:	After noon

Water Measurement:

m^3	:	Cubic metre
m^3h-1	:	Cubic metre per hour
ha-m	:	Hectare-metres
ha-cm	:	Hectare-centimetres
Cft	:	Cubic feet
WUE	:	Water Use Efficiency
AWHC	:	Available Water Holding Capacity
FC	:	Field Capacity
BD	:	Bulk Density
PD	:	Particle Density
PWP	:	Particle Wilting Point
IR	:	Irrigation Requirement
GIR	:	Gross Irrigation Requirement
NIR	:	Net Irrigation Requirement
WR	:	Water Requirement
K_c	:	Crop efficient
K_p	:	Pan Co-efficient
K_y	:	Yield Response Co-efficient
ET	:	Evapo-transpiration
ET_C	:	Crop Evapo-transpiration
PET	:	Potential Evapo-transpiration
CU	:	Consumptive Use
TMC	:	Thousand Million Cubic feet
Cusec	:	Cubic feet per second
ER	:	Effective Rainfall
CAD	:	Computer Aided Design
CPM	:	Critical Path Model
HDPE	:	High Density Poly Ethylene
HP	:	Horse Power

GIS	:	Geographic Information System
CADA	:	Command Area Development Authority
s	:	Second
min	:	Minute
h	:	Hour

Home Science

J	:	Joule
kcal	:	Kilo Calories
ht	:	Height
wt	:	Weight
IU	:	International Unit
ARF	:	Amylase Rich Food
BMI	:	Body Mass Index
BP	:	Blood Pressure
DM	:	Diabetes Mellitus
GTT	:	Glucose Tolerance Test
PDS	:	Public Distribution System
PUFA	:	Poly Unsaturated Fatty Acids
UV	:	Ultra Violet