MANUAL FOR SYNOPSIS AND THESIS PREPARATION

PROF. DR. ABDUL GHAFOOR
INSTITUTE OF SOIL & ENVIRONMENTAL SCIENCES
UNIVERSITY OF AGRICULTURE, FAISALABAD
PAKISTAN

APPROVED AND PULISHED BY
UNIVERSITY OF AGRICULTURE
FAISALABAD, PAKISTAN

2006

The use of some trade names in this book is no way an endorsement of these products by the author

1st Edition 2005

ISBN: 969-8237-07-0

Published by
University of Agriculture, Faisalabad

Printed by
University of Agriculture, Faisalabad

Price: Within Pakistan Rs. 100/-

FOREWORD

The 21st century has brought challenges to improve the quality of science at a much faster rate. Along with the improvements in teaching and research skills, the innovations and explorations and scientific accomplishments are not possible without effective communication. The research workers, particularly the graduate students at universities, need help and guidelines for the preparation of uniform theses for the award of degrees. The support and use of electronic and print media to express have not only facilitated to achieve this goal but also have improved the scientific capabilities. It is my common observation that several significant findings and innovations presented in the form of thesis could not find their proper and esteemed place solely owing to ineffective or inappropriate presentation.

The document titled "MANUAL FOR SYNOPSIS AND THESIS PREPARATION" is essentially a required and thoughtful effort from an experienced and renowned scientist. The author has long experience to publish his scientific work in a variety of national and foreign journals of global repute. Dr. Abdul Ghafoor has long experience of executing research projects, writing technical reports, journal articles, books, supervising graduate theses, and reviewing research materials for a number of scientific publications.

This text has been prepared keeping in view the requirements of students and researchers in different degree awarding universities/institutes of Pakistan. The effort is quite in time as there is a little reference material on writing graduate theses. I am optimistic that this book will finally achieve the objectives of its publication. It will serve as a reference book for graduate students, scientists, young teachers and researchers in this university as well as other professional institutes in Pakistan. I would reckon this endeavour of author as worth benefiting and emulating; however, nothing is ultimate, and there is always a room for improvement.

PROF. DR. BASHIR AHMAD
VICE CHANCELLOR

PREFACE

The purpose of this manual is to help graduate students (M.Sc. and Ph.D.) in completing a better quality dissertation in a shorter time. Experiences in advancing doctoral candidates, in serving on dissertation committees, and in discussions with candidates as they have worked on their dissertations clearly indicate a need for such a document. A systematic approach will assist graduate candidates in managing the completion of their dissertation task. It also has advantages for the advisers because the method can improve utilization of the scarce faculty resource.

The examples in the text reflect our background and, therefore, do not attempt to relate to all conditions that a student in different fields may face. One might have considerable discussion about the truth or appropriateness of these examples or the format of the theses forms. This would miss the essence. The examples and forms are the approach. Advisers may feel free to modify the approach to reflect advising style.

The Ph.D. programmes are being offered in a number of disciplines at the UAF and several other universities in Pakistan. The approach can be used by graduate students. The response is assumed to be very positive, and results achieved by candidates as they follow this approach may provide ample evidence of its usefulness.

The “Manual for Synopsis and Thesis Preparation” is based on the three-decade experience of dealing with graduate students, evaluating their assignments and theses, writing and evaluating research articles and research proposals. During this course of time, a need for coaching the students for theses writing was felt seriously. This text is an effort toward bridging the gap between good research work and its effective presentation as graduate theses.

The students are rarely and seldom formally pruned for the modalities of theses writing. Even experienced and learned professionals are sometimes unable to present and deliver an effective and scientific document. The findings and innovations of a scientist are usually lost if these are not documented and communicated to the community for whom these have been done.

This manual is prepared to assist and provide guidelines to the professionals and students to prepare graduate dissertations. Particularly the beginners always need guidelines and they will get a lot of help from this manual to prepare their theses. Suggestions for further improvement in this effort from readers would be highly appreciated.

The author appreciates the suggestions of the Review Committee comprising Dr. Tanwir Ali, Dr. Javed Aziz and Dr. Zafar Iqbal. Specific suggestions and editing by Dr. Rahmatullah and proof reading by Mr. Saifullah are gratefully acknowledged.

Prof. Dr. Abdul Ghafoor

TABLE OF CONTENTS

LIST OF APPENDICES

INTRODUCTION

The post-graduate programmes of studies in the University of Agriculture, Faisalabad are designed to train students in theoretical as well as practical aspects of agricultural and allied sciences requiring the preparation and presentation of a thesis in partial fulfillment of requirements of degree. It has been noted over time that the theses though conforming to general physical lay out differ considerably in the style and sequence of write up. This results in a considerable variation in volume and exposition of dissertations and theses. In this instruction manual, efforts have been made to include all the relevant information helpful to the students and teachers for the preparation, writing, typing and presentation of thesis. The contents of this manual mainly focus on the preparation of uniform theses.

A graduate thesis is a permanent evidence of contribution made by students in a particular field of knowledge and should reflect credit on the University as well as on the students. In almost all the fields, the productiveness of a scholar depends heavily upon his proficiency as a writer. He/she has a duty to present his findings not only with precision, but also intelligently and attractively.

A thesis must include all the significant results obtained and must disclose all the methods and processes employed in research in such a detail that the work may be repeated by anyone skilled in the field. The student(s) should be scrupulously careful to give references to all the work on which his/her thesis depends directly or significantly. Good usage requires documentation of statements whenever possible by reference to published and unpublished work. Responsibility for different phases in the preparation and checking of a graduate thesis rests jointly with the student, the members of his advisory committee and the graduate (Director Adv. Studies) office. The student is responsible for ensuring that the writing and typing conform to standard format within the general framework of requirement set down herein; the advisory committee for each degree may control the following.

1. Thesis divisions and their order.
2. Terminology for the divisions.
3. Style where it influences organization.
4. The arrangement of reference material in alphabetical order.

The office of the Director Advance Studies (at present) or Dean Graduate Studies (proposed) is responsible for ensuring that the mechanical feature of the thesis satisfies standards for published literary efforts. The student preparing a thesis will find that there is a considerable, often confusing, diversity of style conventions. The principle ones have been brought together in this manual, and collate the principle conventions of scholarly writing into consistent, coherent style system.

The presentation of research results is an important work because of the permanence of record and its reference by others. The manner in which it is done reflects not only upon the individual worker, but also upon the organization of which he/she is a part. The preparation of a manuscript which accurately conveys readable ideas is an essential phase of research; it is just as valuable as doing more experiments; and it is fully as worthy of our best efforts. The question arises how shall we write for presentation to the others, particularly the scientific community? In order to maintain a uniform standard of presentation of research results, guidelines in the next sections are outlined.

POINTS FOR CONSIDERATION

Following hints will help a lot in preparing and writing a graduate synopsis and thesis.

i. Be brief, accurate and to the point.

ii. Avoid repetition or duplication of ideas.

iii. Spare and allow enough time for writing.

iv. Use a simple, direct style which is condensed, but not so condensed as to be cryptic or sacrifices precision and clarity of results.

v. Organize the material in a logical sequence and not according to the order in which experiments were conducted.

vi. Revise the manuscript until it has unity, coherence, emphasis and accuracy, and so clear that it cannot be mis-understood.

vii. Avoid unnecessary details. However, give all the facts necessary for a trained person to repeat the experiment(s).

viii. Design suitable headings, sub-headings and sub-sub-headings. The paragraphs and sentences should be short, to enable the reader to "skim" the thesis for its general subject matter and to locate quickly and detailed part he/she seeks or is interested.

ix. Let tabular data and illustrations speak for themselves. Confine the text discussion to the meaning of the data.

x. Plan the illustrations and tables in relation to page dimensions.

xi. Insert photographs that are glossy, have plenty of contrast and pertain to the text.

xii. Avoid long and complex or undigested (unclassified) data or too many tables.

xiii. Arrange the tables to fit portrait or landscape on a page wherever possible and so cast these that they could be accommodated in the prescribed format.

xiv. Provide a complete and caption/title for every table, figure and illustration which is self-explanatory and nouns in the caption/title preferably should start in capital.

xv. Provide clear and concise column headings and sub-headings.

xvi. Explain every symbol used in a table as a foot note of the same.

xvii. Avoid foot notes for the citation of references, if any, should be included in the text and quoted in the list of references at the end of thesis proceeding to appendices.

xviii. Include letters, survey forms, raw data, statistical computations and other materials which have been used or collected during the study in the appendices.

PART I: PREPARATION OF SYNOPSIS

The synopsis for a graduate programme can be divided into following sections.

1. Title

It should be comprehensive to reflect the main contents and subjects of the research plan to be undertaken by the student.

2. Abstract

The abstract must be written in a single paragraph. This section must start with the first 2-3 sentences about the importance and the rationale of studies, salient field and analytical methodologies, methods and types of data collection, statistical treatment of data, results and finally a concluding statement about findings.

3. Need of the Project

This section must contain statement(s) on the general subject, the orientation, setting, and foundation, on which the investigations were made, but it is not and should not be made a general literature review. The objective and rationale of studies must be described. The purpose of introduction is to orient the readers. It should contain a statement of the problem to be investigated so that the reader(s) can proceed with the nature and purpose of research in mind. It should overview briefly the scope, aims and general characters of the research.

There is a tendency to use "Need of the Project or Introduction" as a second window for "Review of Literature" with the incorporation of several citations. This is a duplication of the scope and purpose of a subsequent section, the "Review of Literature". It is, therefore, desirable that "Need of the Project" should provide a general account of a particular topic on which one has to embark upon.

4. Review of Literature

This is an important section. Before writing this portion, the student should search for relevant research articles from different sources, like library, scientific journals, data bases, internet, major supervisor, senior students and others actively working in his/her selected area/topic of studies. But the student must be critical in selection of relevant

research papers, their review and integration. It is recommended that student(s) must study at least 15-20 original research papers before starting writing of synopsis and must have copies of such papers with them.

5. Materials and Methods

This section should contain elaborative experimental methods, analytical procedures and statistical techniques to be followed, each supported with appropriate and authenticated literature citations, Name-Year system (see thesis section). One aspect which is mostly overlooked is the discussion with a statistician at the planning stage of experiment which otherwise is highly required and very helpful for the students and supervisors. Another aspect worth to consider is the research facilities available in the department of the student, university or any other sister institute from where the requirements could be met.

6. References

An alphabetical order be followed, details of which are given in part II ─ section pertaining to thesis preparation. An acceptable format of synopsis is shown on the next page. However, students are advised to consult GS 7 from time to time changes in rules and regulation by the statutory bodies of the University of Agriculture, Faisalabad.

When the synopsis is at semi-final stage, students defend it in an open seminar at university level. After incorporation of discussed and agreed suggestions in the seminar, the synopsis is to be signed by the student, supervisory committee and other statutory bodies, like Chairperson of the department, Director of the institute, Dean of the faculty. Then it is presented in the office of the Director Advance Studies for final approval from the Advanced Studies and Research Board (ASRB). Student(s) may consult the document titled GS-7 for help and guidelines as amended from time to time by the university.

Three sample pages are given next to specify the format of synopsis.

(Page # 1 – Sample)

UNIVERSITY OF AGRICULTURE, FAISALABAD

DEPARTMENT OF ----------

Synopsis for M.Sc (Hons.), M.Phil. or Ph.D. degrees

TITLE: Sodium affects soil properties, growth and ion contents of cotton

Name of student: ----------

Registration No: ----------

ABSTRACT

(Page # 2 ─ Sample)

UNIVERSITY OF AGRICULTURE, FAISALABAD

DEPARTMENT OF ----------

Synopsis for M.Sc (Hons.), M.Phil. or Ph.D. degrees

TITLE: ----------

Date of Admission: ----------
Date of Initiation: ----------
Probable Duration: ----------

Supervisory Committee

1. ---------- Chairman
2. ---------- Member
3. ---------- Member
4. ---------- Special member (Optional)

Need of the Project

----------.

Review of Literature

----------.

Materials and Methods

----------.

References

----------.

(Last page ─ Sample)

SIGNATURES

Name of student: ---------- ----------

Supervisory committee (Name & Signatures)

1. ---------- (Supervisor) ----------

2. ---------- (Member) ----------

3. ---------- (Member) ----------

4. ---------- (Special member, if any) ----------

PART II. PREPARATION OF THESIS

1. The Volume of Thesis

The bulk of a thesis is no criterion for the excellence of a piece of work. A student must keep in view the economy of space, labour, time and clarity of presentation. Padding with lengthy descriptions and avoidable discourses do not add to the standard of scholarship. The study of science enjoins on us a forthright, objective description of phenomenon and interpretation of results. It is therefore, essential that the bulk of a thesis must be carefully controlled, e.g. around 75-100 pages for M.Sc. (Hons.) or M.Phil. thesis and 150-200 for Ph.D. dissertation in experimental, social and descriptive sciences including appendices and tables (excluding illustrations) may be a reasonable volume to incorporate and digest a lot of scientific information.

2. English Usage and Grammar

The students will be responsible for correct English usage and grammar. Small sentences comprising 25-30 words may be good practice to follow. A good sentence is one which describes or addresses one thing at a time in minimum words. Such straightforward sentences are easy to construct (e.g. “There has been an increase in the amount of milk consumed by teenagers” and “Teenagers are drinking more milk” ─ compare the two sentences to say the same thing). The students may seek help of other competent persons in this regard. The brief description given below will help the students in correct expression. The following few rules address usages that have given many authors trouble in the past; any standard grammar book may be consulted for details. A good flow and consistency of language in statements and paragraphs should always be maintained which makes the presentation attractive.

a. Punctuation

- Use a comma before 'and' or 'or' in a series of three or more items, e.g. "0.8, 2.1, and 3.9 kg ha^{-1}"; "shoot biomass, root biomass, leaf blade or leaflet length and width, and plant height"; but "nodule weight and size and N_2 fixation."
- Use a semicolon to separate a series of items within a list if any one of them itself includes a comma, e.g. Treatments in the second fertilizer study were @ 56, 112 and 448 kg ha^{-1} N; 25 and 49 kg ha^{-1} P; and 47, 93, 139, 186 and 279 kg ha^{-1} K.

- Punctuation in display lists (where each item starts on a new line) depends on the content and context. If all the items are short, independent phrases, use no period. If anyone of the items is a complete sentence, end each item with a period. If the list is functionally part of the introductory sentence, punctuate with commas or semicolons and a final period, just as we would if the sentence had no line breaks.
- Use no comma in dates, e.g. May 2000; 14th May 2000.
- Commas and periods come before a closing quotation mark, an asterisk, or a superscripted footnote number; semicolons and colons come after. Do not double periods at the end of a quotation: "Once is enough."
- Use single quotes around cultivar names the first time these are introduced in the abstract or text; however, do not use both single quotes and the abbreviation cv. or the word 'cultivar'. Place punctuation outside of the single-quote marks. Do not use cultivar quotes with landraces or experimental lines.
- For parentheses within parentheses, substitute brackets for the inner pair. For example: "---- declared the problem solved (Lloyd-Jones, 1873 [as cited by Andrews. 1996])." Professional Societies publications require two exceptions in prose:
  - Use brackets to enclose scientific names that already contain parentheses, as in "soybean [*Glycine max* (L.) Men.]" was ------- "An alternative is to use commas, as in "soybean, *Glycine max* (L.) Men., was -------."
  - Put equation numbers within brackets, regardless of other parenthetical marks. For example: Eq. [1], Eq. [3] to [9].
  - For mathematical usage, fences are used inside out in the order [{( )}].
- To form the plural of most abbreviations without periods, add a final s (e.g. RFLPs. PIs, SEs). To form plurals of abbreviations with periods, lowercase letters used as nouns, upper case letters that might be confused for something else, and for abbreviations or symbols ending in a superscript or subscript, put an apostrophe before the ‘s’. For example M.S.’s, A’s, F2’s.
- It is advisable to follow anyone English dictionary consistently throughout the text in general or where no explanation is provided in this manual regarding the punctuation. The common dictionary in use is one published by M/S Longman or Oxford.

b. Hyphens, Spaces, and Dashes

A word containing a prefix, suffix, or combining form is a derivative and is almost always written as one word. Compound words used to express an idea different from that expressed by the separate parts are usually written as one word. Hyphens and en-dashes are used to avoid a confusing sequence of letters, a confusing sequence of adjectives, a jumble of ideas, or possible confusion with a word of the same spelling without the hyphen, e.g. co-op, as distinct from coop. Comprehensive rules for compounding words can be found in dictionaries, books of usage, and style manuals. Most of the compounds and derivatives fall under the following general rules:

- Derivatives are usually written solid, e.g. antiquality, clockwise, fourfold (but 10-fold or 1.5-fold), nonadditives, nonsignificant, postdoctoral, preemergent, reuse, shortwave.
- Where several usages are acceptable, choose one and use it consistently throughout the manuscript, e.g. winter hardiness or winterhardi-ness, but not both; likewise, main stem or mainstem, but not both.
- Use hyphens with prefixes to words that begin with a capital and sometimes in a few awkward combinations that bring like vowels together, e.g. un-American, semi-independent.
- Hyphenate a compound adjective when used before, but not after, the word it modifies, e.g. a winter-hardy plant; the plant is winter hardy.
- Hyphenate two-word verbs but not phrasal verbs. The distinction is not always obvious, but two-word verbs usually have the modifier first and the main verb second; phrasal verbs have the verb first. It may be easier to memorize a few often-used forms. Common examples include air-dry, heat-shock (but 'heat shock' as a noun), out-cross (but 'crossing out'), winter-kill (but 'winterkill' as a noun).
- Compounds in 'cross' are so many and varied that a reference list drawn from a good dictionary can help: cross-check, cross-country, cross-examine, cross-eyed, cross-fertile, cross-fertilization, cross-fire, cross-grained, cross-hair, cross-index, cross-legged, cross-link, cross-linkage, cross-linked, cross-multiply, cross-pollinate, cross-pollination, cross-product, cross-purpose, cross-reaction (antigens), cross-reference, cross-section, cross-sectional, cross-sterile, cross-tolerance, crossbred, crossbreed, crosscut, crosscutting, crosshatch, crossing-over (in genetics), crossover, crosspiece, crosswalk and crosswind.

- Use a hyphen after a prefix to a hyphenated adjective, e.g. semi-winter-hardy plant, non-winter-hardy plant.
- Use a hyphen in a compound adjective that includes a number. This applies especially to units of measure, e.g. 10-yr-old field, 6-kg samples, 4-mm depth, 5 to 10-cm layer.
- Hyphenate compound modifiers starting with the adverb 'well', except when another adverb precedes it, e.g. well-known method, but very well known method.
- Do not use a hyphen after an adverb formed by adding 'ly' to an adjective, e.g. an intensively cultivated hillside (Note that the word 'early' ends in 'ly' but is not an adverb; therefore, "early-morning data collection" is correct.)
- Use a hyphen for compound adjectival expressions as needed for clarity, e.g. "on a per-gram basis, winter-grown cereals, but low molecular weight substance".
- Use an en–dash instead of a hyphen in a compound or prefixed adjective that has a phrase in one of its pans (and the phrase cannot be hyphenated), e.g. "*Avena sterilis*–derived resistance genes; pre–Civil War surveys."
- Use an en-dash instead of a hyphen after a superscript or subscript, e.g. F3–derived; NO_3–N; but 'nitrate N' when spelled out.
- Use hyphens to join numbers and prefixes in chemical names, e.g. trans-2-bromocyclopentanol. There are exceptions (see Dodd, 1986 for more details).
- Use an en-dash between joined nouns of equal importance, e.g. Webster–Nicollet soil complex; log–normal function; oxidation–reduction potential; corn–soybean rotation; fusarium wilt–root–knot nematode complex.
- As a specialized instance of the previous rule, use an en-dash between two chemical compounds, e.g. HC1–H_2SO_4.
- In references and in parenthetical values, use an en-dash to indicate a range of numbers, e.g. "p. 23–49; Plant Dis. 66:172–176; during the final study years (1997–1999). If either of the numbers is negative, or is otherwise modified, then use the word 'to' instead of the dash, e.g. a score of -200 to 250; -5 to 10°C.
- The above rules are given in part to explain why sometimes hyphens and sometimes en-dashes appear in final typeset form, and why sometimes hyphens are added and

sometimes deleted. If we can not or do not wish to distinguish hyphens from en-dashes in a manuscript, use hyphens throughout. Getting the hyphens absolutely correct is far from the most important step in preparing a scientific document like theses. However, never make a one-letter division, like a-mong; never carry over suffixes such as -ed, -able, -ible, -ing; do not divide the initials of a name, or the forename and the initials, the month and the day or such combinations as £12, 4s, 2005 BC or 6.00 P.M.; never carry over the hyphen to the next page.

c. Correct Use of Common Words

The following entries address common difficulties in scientific use of very common words.

Affect vs. effect *(verb).* 'To affect' means **to act** upon something that already exists; 'to effect' means to bring some thing or condition into existence.

Affect, vs. **effect** vs. **impact** *(noun).* An 'effect' is a result or outcome; an 'affect' is an emotion (the term is used chiefly in psychology); an 'impact' is a collision, the force of a collision, or (by extension) a major effect. That is, 'impact' is not a neutral equivalent of 'effect'.

Alternate vs. alternative. Use 'alternate' to mean occurring or following by turns, or alternating in time or space — first one, then the other. Use 'alternative' for one of two or more mutually exclusive possibilities.

Based on vs. on the basis of. 'Based on' is adjectival and must modify a noun or pronoun which usually immediately precedes it. For example "This conclusion is based on four years of experience" or "Conclusions based on experience may still require testing." To modify a verb, use a phrase starting with "on the basis of. EXAMPLE: Change "based on the first four years of results, we discarded the original hypothesis" to "on the basis of our results, we discarded the original hypothesis."

Between vs. **among.** Use 'between' for two entities; 'among' for more than two.

cf. (Latin *confer,* compare) vs. see. Use ‘cf.’ sparingly, to mean "see, for a contrasting view." For scientific writing, the English 'see' and 'compare' are preferable.

Compare to vs. compare with *(verb + preposition).* Use 'compare to' to point out similarities only; use 'compare with' to point out differences (or both differences and similarities). More broadly, use 'compare to' for overall likenesses and contrasts and for subjective, qualitative comparisons and use 'compare with' for objective, quantitative comparisons. Also do not be afraid to simplify "more --- compared with" to "more --- than" (e.g., "more bio-mass at the second harvest than the first" instead of "more biomass at the second harvest compared with the first").

Due to *(adjective or preposition)* vs. because of *(preposition).* 'Due to' as an adjective must modify a noun or pronoun; as a preposition, however, it is equivalent to 'because of or 'owing to' and can modify a whole clause. Authorities disagree on this usage. The ACS manual (Dodd, 1997) rejects the prepositional usage, and both *Webster's Tenth New Collegiate Dictionary* and *The Hew Fowler's Modern English* (Burchfield, 1996) uphold it. The CBE manual (1994) is silent on this point (CBE, 1994, p. 756). A writer who wishes to avoid minor controversy may safely use 'because of instead of 'due to' at the beginning of a sentence or an independent clause.

e.g. (Latin *exempli gratia,* for example) vs. i.e. (Latin *id est,* that is). Use 'e.g.' to give an example out of available possibilities; use 'i.e.' to specify exactly what is intended, if, as you write, you think "for example" and "that is" instead of "ee-gee" and "eye-ee", you will not have trouble with the distinction.

e.g. and i.e. vs. for example and that is. Use the abbreviated form in figures, tables, and in parentheses; otherwise, use the English words in full.

Ensure vs. insure *(verb).* Use 'ensure' to mean "make certain that a desired outcome occurs." Use 'insure' to mean "protect" against monetary loss as in an insurance policy.

et al. (Latin *et alii,* and others) vs. etc. (Latin *et cetera,* and the rest). 'Et al.' is limited to reference citations and entries, and refers to people. There is one period ('et al.', not 'et. al.' or 'et al'). , and only one 'etc.' refers the reader to additional, unspecified examples of what has just been mentioned. If an adequate group of examples has been introduced as such (with 'e.g.' or 'for example'), the 'etc.' is unnecessary. If the reader needs to be told to think of other possibilities, say so in English words ("and the like" or "and so forth"). In scientific writing, however, a specific statement is preferable. Give the right examples, or a complete list, but do not leave it to the reader to figure out what else we mean.

Further vs. farther *(adj. or adv.).* 'Further' means in addition or to a greater extent; 'farther' implies distance in space or time.

Geographical names. Use common English equivalents of place names where such exist (e.g. Rome, not Roma; Munich, not Munchen; Mexico City, not Mexico; but Buenos Aires. Beijing).[1]

[1] Many dictionaries include geographic names, either in the regular sequence or as an appendix. Geographic coordinates as well as spelling can be checked on-line at http://mapping.usgs.gov/ www/gnis/gnisform.html *(for* the USA and Antarctica) or http://164.214.2.59/gns/html/index.html (for the rest of the world).

Likely vs. probable *(adj.)* **and likely** vs. **probably** *(adv.).* In general, use ‘probable’ and 'probably', unless the emphasis is on the future. 'Likely' is often used in combination with another adverb (e.g. more likely, most likely, very likely), but such expressions do not often have a place in scientific writing. For example "The phenomena described in this research could probably have ---," but not 'The phenomena described in this research could likely have ---" (because the statements are in the past). "It is likely that the results will ---" is a good use of likely, since it looks to the future: "It is likely that the results were ---" makes sense only if the emphasis is less on the explanation than on the likelihood of the explanation.

Percent vs. percentage vs. percentage point. 'Percent' is used with numeric values, and is spelled out only at the beginning of a sentence. 'Percentage' describes such a value, and is always spelled out. 'Percentage point' is used with numeric values, and refers to a step of 1% in a percentage value; it is treated as a word, not a unit, and so is not abbreviated. For example "Grain fill was 20%; Nine percent of the plants; the percentage of grain fill."

Principal *(adj.)* vs. principle *(noun).* Use ‘principal’ to mean foremost, chief, main; use 'principle' to mean a tenet or belief.

Restrictive and nonrestrictive clauses (that vs. **which).** Generally, 'that' introduces a restrictive clause, one that gives information essential to the meaning of the sentence; 'which' may also do so, but to be read as restrictive the 'which' must not be preceded by a comma. Examples: "Only soil samples that contained >30% clay were tested. Those samples which were rejected for testing were stored for use in a separate study. This is the house that Jack built." If in such sentences, the restrictive 'that'-clause were omitted, essential meaning *(what kind of samples? >30 % clay; which samples? the rejected ones; what about this house? Jack built it)* would be lost.

"Which" introduces a nonrestrictive clause, one that gives only incidental or supplemental information. For example "The soil samples, which had been stored in a rain shelter, were tested for clay content. The rejected samples, which received no further treatment, were stored for use in a separate study. The house, which Jack built, will be razed next week. If in such a sentence the nonrestrictive 'which' clause were removed, the basic statement *(samples were tested, samples were stored, the house will be razed)* remains.

The difference in meaning between restrictive 'that’ or ‘which’ and nonrestrictive 'which' is so important, but is signaled by so slight an item as an ordinary comma, that it may be worth resorting to a simple rule. Use 'that' (but not ‘which’) with no comma before when

the added phrase gives essential information (is restrictive); use 'which' with a comma before when the added phrase is incidentally useful (is nonrestrictive).

Some troublesome singulars. Apparatus (pl. apparatuses or apparatus); criterion (pl., criteria); medium (pl., media); phenomenon (pl., phenomena); species (pl., species).

Use vs. employ *(verb).* 'Use' is the simpler word, and neutral. 'Employ' carries additional connotations, as of advantageous use or hiring for wages.

Use vs. utilize *(verb).* The meanings are not identical. Use 'utilize' meaning "to turn to practical use" only to indicate that some unexpected use was found for an object or procedure, e.g. At the development phase, it was possible to utilize earlier research. The word ‘use’ is used to put something to a particular purpose, e.g. The old hospital is not used anymore.

Using. The participle 'using' must modify the agent of the action, and the agent must be expressed. People (and experiments) use, but plants and pieces of equipment do not. A passive sentence such as "the samples were oven-dried using the larger oven" implies "by us" (this grammatical construction is called *subject understood),* but in scientific writing an explicit statement is far preferable. Recast the sentence in the active voice (We oven-dried the samples using ---). Alternatively, change "using" to "with" for pieces of equipment or materials and "by" for procedures.

Whereas vs. while vs. but. Most contexts require only the simple 'but'. Use 'whereas' only when we intend a strong and parallel contrast (while on the contrary). Use 'while' occasionally for a mild and parallel contrast, but never when it can be confused with "and at the same time. Except in formal proclamations and resolutions (where it means "in view of the fact that"), 'whereas' requires a comma before and takes no comma after.

Words of foreign origin. Foreign words in common usage in English (such as denouement, de novo, per diem, or Zeitgeist) are considered to have been incorporated into the language. They are thus considered English words, and are set in roman type, not italic. Dictionaries indicate roman vs. italics for words of non-English origin. Common words of this kind include ad hoc, a priori, et al., in situ, in vitro, in vivo, per se, vice versa, and vs. Do not hyphenate such foreign words, not even in adjectival position (e.g. in vitro development, ex officio member, in situ changes).

/ (slash or solidus). With rare exceptions, the slash is reserved for mathematical division and ratios. If we want to express a combination of ideas, decide on exactly what we mean and say it in words. For example "In an expression such as 'appearance of collar/ligule of first leaf, change the wording to 'collar or ligule', 'collar and ligule' or 'collar and/or ligule'. "

Slang words. The authors/writers should avoid the use of such words as for as possible or should give some explanation for the readers and audiences.

Foreign Words: Foreign words are underlined unless used in a quotation. Foreign words that have been anglicized need not be underlined.

Tense: The past tense is proffered for scientific writing . Exceptions are quotations and references to existing facts , or to facts which will be true in the future , in which cases the present and future tenses may be used.

Person: Personal pronouns (I, we, he, they, and the like) should be avoided .For example, "Clover was found to be better quality than was alfalfa " is preferable to "I (or he, they, etc.) found that clover was of better----". However, an exception to this rule is the case where personal pronouns appear in material that is quoted.

ABBREVIATIONS

Use abbreviations sparingly. If we have to abbreviate, try to find a standard abbreviation given in Ulrich, Abacus or CABI abstracting agencies rather than making up one specific to our paper. If the use of an ad hoc abbreviation is necessary, avoid letter groups that already are familiar abbreviations but with a different meaning. For a fictitious example, do not abbreviate leaf appearance interval as LAI, even if we are not going to discuss leaf area index. Some commonly used abbreviations and acronyms (an acronym is an initialism or abbreviation that can be pronounced as a word) have become words in themselves; DNA and ELISA, for example, are rarely spelled out.

Avoid using abbreviations at the beginning of sentences and in titles. Never begin a sentence with a single-letter abbreviation (I instead of iodine, for instance). Let the context decide whether to use an abbreviation. What makes sense in the dense presentation of Materials and Methods or the quantitative presentation in Results may be clumsy in the introduction or the conclusions. Abbreviations could be used in the text provided it is written in full where it appears first time in text. The following are exceptions to this rule:

1. **Titles:** Such as Mr., Mrs., Ms., M/S, Sr., Jr. etc. are always abbreviated.

2. **Lengthy Words:** Acceptable abbreviations for lengthy words and phrases are used separately throughout the text. Such abbreviations must be presented in parentheses immediately after the words or phrase for which they stand. For example “Phosphate buffered saline (PBS) was used in all dialysis operations”. In succeeding sentences throughout the thesis, initials PBS could be used in place of words phosphate buffered saline.

3. **Commonly Used Abbreviations:** Abbreviations such as “mm” and “cm” which do not require a period, or an “s” to make a plural, are acceptable. The very form must agree with the quantity, e.g. “one mm is…., but Three mm are …”

4. **Space and Time:** To save space and time, it is sometimes convenient to use abbreviations for lengthy words or phrases used separately throughout the text. Abbreviations must be presented in parenthesis immediately after the words or phrases for which they stand.

In "Discussion" and "Summary" parts of a Thesis, while discussing the results, students often fail to mention the exact nature of treatment and give only symbols such as A , B , C & D or I, II, III & IV or T1, T2, T3 & T4 etc. This often confuses the reader(s) and he/she finds it difficult to fully grasp the idea meant to be clarified. If the reader has to refer to the previous pages again and again, for the explanation of notations and symbols, the very interest in the publication is lost. It is therefore, essential that treatments should be explained very briefly within parenthesis whenever the symbols are used. Alternatively use symbols for treatments which are very much self explanatory. However, always try to use internationally accepted abbreviations throughout the thesis. A list of commonly used and nationally/internationally accepted abbreviations is given (Table 1, Appendix 6)**.** In addition to this list and all of the above statements, it is preferred to prepare a list of abbreviations and symbols used in the thesis and to place it before the acknowledgement page.

Common abbreviations that do not need definitions. Use may be restricted in tables and figures (T), with numeric values (N) or in addresses (A)

Abbreviation	Meaning (restriction)	Abbreviation	Meaning (restriction)
a.i.	active ingredient	Inst.	Institute, Institution (A)
Agric.	Agriculture, Agricultural (A)	Int.	International (A)
ARS	Agricultural Research Service (A)	Max.	Maximum (T)
ASA	Am. Society of Agronomy	Min.	Minute (N)
Avg.	Average (T)	Min.	Minimum (T)
CI	Cereal Investigation	Mo	Month (N)
Coef.	Coefficient (T)	No.	Number
CSREES	Cooperative State Res., Edu. and Extension Service (A)	NRCS	National Resources Conservation Service (A)
CSSA	Crop Sci. Society of America	o.d.	Outside diameter (N)
cv. or CV.	Cultivar	PI	Plant Introduction, Plant Identification
d	Day (N)	Res.	Research (A)
Dept.	Department (A)	S	Second (N)
Diam.	Diameter (T,N)	Sp., spp.	Species
Dry wt.	Dry weight (N,T)	SSSA	Soil Sci. Soc. Am.
EC	Electrical conductivity	Stn.	Station (A)
SCS	Soil Conservation Service	TVA	Tennessee Valley Authority
ELISA	Enzyme-liked immunosorbent assay	Univ.	University (A)
Eq.	Equation, Equations (N)	USA	United States of America

Expt.	Experiment (A, N)	USDA	US Dept. of Agriculture
Fig.	Figure (number), Figures (range of numbers)	US-EPA	US Environmental Protection Agency
Fresh	Fresh weight (N,T)	VS., vs.	Versus
Gt.	Gravity constant	Wk	Week (N)
i.d.	Inside diameter (N)		

The CI must be followed by a two-letter abbreviation for applicable in cereal genus: Cl*av* for oat, CI*ho* for barley *(Hordeum),*CI*tr* for wheat *(Triticum),* etc.

Use cv. only before a cultivar name, and preferably only if also after a scientific name.

§ Abbreviate only with values ≥ 6; otherwise, spell out both number and month, with sonic indication that the value is approximate.

Despite the strictures of the CBE style manual (CBE, 1994, p. 187), do not use “nr” as an abbreviation for number; do end this abbreviation with a period (No.).
Use this symbol only after a genus name.

THESIS AND ITS SUB-SECTIONS

A thesis generally covers full information on a narrow field of studies conducted by a scientist and presented in a logical sequence. It cannot be compared to a book or a monograph. In writing a thesis, certain conventions in presentation are observed. This special type of presentation is generally sub-divided into following parts and subsections:

1. The Preliminaries

- **a.** Title page.
- **b.** Dedication (Optional).
- **c.** Acknowledgements.
- **d.** Table of contents with page references.
- **e.** List of tables with titles and page references.
- **f.** List of figures with titles and page references.
- **g.** List of illustrations, if any, with page references.
- **h.** List of appendices, if any, with page references.

2. Main Body: This part is divided into following chapters:

- **a.** Introduction.
- **b.** Review of Literature.
- **c.** Materials and Methods.
- **d.** Results and Discussion.
- **e.** Summary and conclusions.

3. References

4. Appendices

A brief description about the sections and sub-sections is given below for the sake of general guidelines to students.

1. The Preliminaries

a. Dedication: This part is optional.

b. Acknowledgement: In acknowledgement, credit should be given to individuals who have contributed to the research or to the thesis preparation, funding agency of research and the institute that facilitated the research work.

c. Table of contents: The table of contents should list in order the titles of major divisions and subdivisions exactly as these appear in the body of thesis (Appendix 1), the list of figures, all with their page citations. Also include the list of references and appendices. No material preceding the table of contents should be enlisted in it. Examples of acceptable format of tables of contents are given in the appendices 1-4.

The heading, table of contents, is typed one line space in the centered capitals at top of page and without terminal punctuations. The body of the table of contents then follows one 1.5 line space below. Table of contents (continued) is put on succeeding page(s) flush with the left margin. Spacing depends on the table. Generally, use a 1.5 line space between major headings and between major and sub-headings; use a single line space between sub-headings of the same order. Major headings are in capitals or in title format. Major headings begin at the left margin; and second order sub-headings two more spaces. All the words in sub-headings are in title format except articles, prepositions, and conjunctions except in cases where any of the letters is the first in a title.

d. List of tables and figures: If tables and figures are used in the thesis, list of tables and list of figures must be included in the table of contents but on separate pages.

i. List of tables: The position of the heading, list of tables is the same as for the table of contents, with the column heading, page, in the same position. Arabic numerals are used for tables. These are typed at the left margin and aligned vertically by the period marks following each number (Appendix 2).

ii. List of figures: The list of figures (Appendix 3) appears on a separate page and in the same general form as the list of tables. No distinction is made among drawings, figures, or photographs. These should all be designated as figures and numbered consecutively with Arabic numerals.

e. The handling of tables and figures: All the tables (Appendix 2) and figures (Appendix 3) are faced in the same manner as the written text unless dimensional considerations require the presentation along the length of the page. In this case, these should read properly when the page is rotated 90 degrees clockwise.

Figures larger than the normal page size usually may be reduced photographically. If reduction is not feasible, the material may be folded. When folded, the sheet should be approximately, but no larger than 8.25 by 10.75 inches with a 1-inch left margin for binding remaining free of folds. Because of special requirements of the microfilm service, this arrangement is not recommended for the Ph.D. thesis. Samples of lists of figures are shown in appendix 3. All the figures and tables must be numbered and titled. The number and title of figure are placed one 1.5 or double line space below the figure.

2. Main Body

The construction of main body of a thesis is the joint responsibility of the student and his Advisory Committee. It should be appropriate to the character of the work to be reported. Generally, following sections are included.

a. Introduction: This is more extended and elaborative version of the introduction as presented in the synopsis. It is re-emphasized that this chapter must contain statement(s) on the general subject, the orientation, setting, and foundation, on which the present investigations were made, but it is not and should not be made a general literature review. The objectives of studies must be described. The purpose of the introduction is to provide an overview of the problem. It should contain a statement of the problem investigated so that the readers could proceed with the nature and purpose of the thesis in mind. It should briefly outline the scope, aims and general character of research.

There is a tendency to use “Introduction” as second window for “Review of Literature” with the incorporation of several citations. This is a duplication of the scope and purpose of a subsequent section, the “Review of Literature”. It is, therefore, desirable that “Introduction” should be kept confined to a general account which has led one to embark on a particular project.

b. Review of literature: The "Review of Literature" should begin with a few references by way of introduction, the rest or bulk should only include citations pertinent to the investigations. A "Review of Literature" is thus a documentation of the related work done by others, its merits and limitations, i.e. critical analysis of reported research on the problem or topic under review. The review may be placed under sub-headings for clarity and more critical analysis. In principle, the Review of Literature should provide an account of research work done by others on the related topics. Implicitly it has to be a critique of the previous research results.

While it is not the intention to discourage the students from presenting all the information he/she likes to include in a "Review", it is necessary at the same time, that a judicious care is taken by his teacher while editing, to retain only those references which are pertinent to the subject of thesis. The students are advised to be exact and concrete in preparing a critique of results of research done in the past. The following steps are usually involved in the preparation of Review:

- Before a student starts working on a thesis, he/she should consult his teacher about the need and scope of the "Review" as well as digestion of reviewed information in the "Discussion" so as to eliminate diffused and unnecessary literature on various aspects of an extensive field.
- The students may do full exercise at the first typing stage taking note of English Usage and Grammar and get it vetted by his/her Supervisory Committee to bring it within the four corners of logical presentation of the information which is pertinent to his/her subject.
- After vetting, thesis should be typed on an ordinary paper and a semi-final thesis be submitted to the Directorate of Advance Studies for a final general check, after which final typing may be done.

These stages of work will allow a student to have mental satisfaction of presenting everything that he/she thought was necessary and by the end will be trained for scientific presentation of facts.

Overall, the Review of Literature should be a complete and orderly development of the status of the knowledge in the area bearing of the work. It should be divided into subsections as appropriate for the particular situation. The sub-sections dealing with

different aspects of work should be arranged as nearly as possible in the same order as the items are considered in later divisions. The On-Line Search facility and Computer Search Services are very helpful for review of literature. To improve the database, a researcher should become familiar with:

i. The contents of database particularly list of publications and rationale for included items.

ii. The methods of obtaining documents and other materials uncovered by the search.

iii. The structure and contents of system dictionary of key words or descriptors.

iv. The method of constructing search instructions using key words and logical operators.

v. The likely number of items to be obtained by a search request, sometimes provided by documentation.

c. Materials and methods

In some cases, the word "Materials" is not applicable. In such cases this chapter may be named "Methodology". This section usually explains various aspects of what materials were used and how the work was done. The soundness of research has its foundation on the methods followed by the investigator. The validity of his/her technique and logic of interpretation need to be clearly stated and must be acceptable.

To understand and evaluate a thesis, readers would like to know exactly how the study was carried out. If the author does not supply complete information in this chapter, no credence can be placed on the research results and conclusions. It is also essential that the material selected and the basis of selection, if drawn from literature, be clearly described along with other relevant information on the subject.

If a student does not attend to his work personally, he/she will always remain shy and indifferent to the use of research, analytical procedures, statistical methods and their presentation. The make and models of scientific equipment used may be mentioned which will help validate the health of findings.

d. Results and discussion

Some workers name this chapter as simply "Results and then Discussion" separately. This is the main and an important part of the manuscript containing description of experimental observations. Representative data, therefore, should appear in a clear,

concise, and logical form. The emphasis should be on precise description of the phenomenon observed as well as collection of data and not on reflection.
A very common error to be avoided, when no number is involved, the word percent should be used instead of percentage, e.g. "it was expressed as a percentage of the total; it was 10 percent or 10 % of the total but not to be expressed as percent of the total.

e. Discussion

If results are given in one section and the discussion in another, then title "Discussion" may be given. If both the "Results and Discussion" are presented combined, then separate title "Discussion" must be avoided.

In this section, the writer may answer the questions "So what?" as he/she interprets his/her data in relation to the original objectives. He clarifies the meanings and implications of various results and may indicate possible future developments. The reasoning done must be accurate and in accordance with a recognized method of logic. It is emphasized again that "Review of Literature" and "Discussion" parts of a thesis, are intimately related, the former reflected entirely in the subsequent account.

f. References

It is important that the students should go to the primary sources of information and an effort always be made to obtain the information from original articles published in a journal or a reprint obtained from the author. The tendency to cite the literature from abstracting journals is neither enough nor in scientific spirit. In only unavoidable circumstances, the secondary source of information may be utilized or when the original article is in a language other than English. Secondary reference(s) should be written in parenthesis after quoting primary reference without the main heading. Following points should be kept in mind while enlisting references.

i. References should be arranged alphabetically according to author and then according to the year.

ii. A complete reference includes author(s), year of publication, complete title of the paper, and reference to journal (See sample references).

iii. The number of the issue of the volume of a journal may not be given, unless paging of each number starts from 1 or issue number may be given in all the references consistently.

iv. In case of book, the name of the author(s), year of publication, title, edition and complete address of the publisher must be given and should not be underlined.

v. Names of journals and number of their volumes should not be underlined.

vi. The words 'Idem' and 'Ibid' may be avoided in citing references.

vii. Abbreviations for journals should be used as given in Appendix 5.

viii. The word 'References' may be used in preference to 'Literature Cited'.

ix. The title must appear exactly as it does on the first page of article or the title page of the book.

x. For titles of scientific papers, only the first letter of the first word is capitalized (exceptions are proper names, scientific names or certain other words which are capitalized always).

xi. The family name of the first or sole author precedes the initials or given names. The names of co-author(s) follow in normal order and are separated by comma.

xii. When the reference is the proceedings of a symposium etc. and the author to be cited is the editor, it may be indicated as such in parenthesis.

xiii. References except of publication by Government department or other Organizations, for which no author is known, may be listed as Anonymous.

xiv. In case of publications of organizations, learned societies or Government department, the name of the organization, Government department, Ministry or Division be given in place of author, if no author is indicated in the publication.

xv. Work of authors, whether individual or joint should be discussed under different topics or headings in the review, i.e. integration and analytical treatment.

xvi. There are many systems of writing References in vogue in various sciences and journals. With this end in view, a model list is given in Table 2 to be followed for uniformity in the theses preparation.

Format of Listing References

i. Journal article

Ghafoor, A. and A. Salam. 1993. Efficiency of Ca^{2+} concentration in irrigation water for reclamation of a saline-sodic soil. Pakistan J. Agric. Sci. 30:77-82.

Kelly, J.D., J.R. Stavely and P.N. Miklas. 1996. Proposed symbols for rust resistance genes. Annu. Rep. Bean Improv. Coop. 39:25-31.

Lemmon, H. 1986. Comax: An expert system for cotton crop management. Sci. 233:29-32.

Hassan, A., M. Abid, A. Ghafoor and M.R. Chaudhry. 1996. Growth response of wheat and sorghum to EC_{iw}, SAR_{iw} and RSC grown on the Rasulpur and Bhalike soil series. Pakistan J. Soil Sci. 11: 5-9.

Tiessen, H., E. Cuevas and P. Chacon. 1994. The role of soil organic matter in sustaining soil fertility. Nature. 371:783-785.

ii. Article in serial publication

Brown, P.D. and M.J. Morra. 1997. Control of soil-home plant pests using glucosinolate-containing plants. Adv. Agron. 61:167-231.

Edwards, A.C. and M.S. Cresser. 1992. Freezing and its effect on chemical and biological properties of the soil. Adv. Soil Sci. 18:59-79.

iii. Article not in english with english abstract

Title translated into english

Rosolem, C.A., J.C.O. Silverio and . O. Primaves. 1982. Foliar fertilization of soybean: II. Effects of NPK and micronutrients. (In Portuguese, with English abstract.) Pesq. Agropec. Bras. 17:1559-1562.

Title in original language

Rosolem, C.A., J.C.O. Silverio, and 0. Primaves. 1982. Adubacao foliar de soja: II. Efeitos de NPK e micronutrients. (In Portuguese, with English abstract.) Pesq. Agropec. Bras. 17:1559-1562.

iv. Without english abstract (Translated title)

Vigerust, E. and A.R. Selmer-Olsen. 1981. Uptake of heavy metals by some plants from sewage sludge. (In Norwegian.) Fast Avfall. 2:26-29.

v. Magazine article

Anonymous. 1984. Computer programmes from your radio? Agri. Marketing. 22(6):66.

Mulvaney. D.L., and L. Paul. 1984. Rotating crops and tillage. Crops Soils. 36:18-19.

vi. Article with known errata follow-up

Baker, J.M., E.J.A. Spaans and C.F. Reece. 1996. Conductimetric measurement of CO_2 concentration: Theoretical basis and its verification. Agron. J. 88:675-682 [errata: 88(6):vii].

vii. Books (including bulletins, reports, multivolume works, series)

Brown, J. 1966. Soils of the Okpilak River region, Alaska. CRREL Res. Rep. 188. U.S. Army Cold Reg. Res. Eng. Lab, Hanover, NH, USA.

Bernard, R.L., G.A. Juvik, E.E. Hartwig and C.J. Edwards. 1988. Origins and pedigrees of public soybean varieties in the United States and Canada. USDA Tech. Bull. 1746.

Chemical Abstracts Service. 1989. Chemical Abstracts Service source index: 1907-1984 cumulative, plus annual supplements. Chem. Abstr. Serv., Columbus, OH, USA.

Dzombak, D.A. and F.M.M. Morel. 1990. Surface complexation modeling: Hydrous ferric oxide. John Wiley & Sons, New York, NY, USA.

Ghafoor, A., M. Qadir and G. Murtaza. 2004. Salt-affected soils: Principles of management. Allied Book Centre, Urdu Bazaar, Lahore, Pakistan.

Lal, R. (Ed.) 1998. Soil processes and the carbon cycle. Advances in Soil Science. CRC Press, Boca Raton, FL, USA.

viii. Book equivalent: Numbered bulletin, report or special publication

California Certified Organic Farmers. 1995. California Certified Organic Farmers certification handbook. CCOF, Santa Cruz, CA, USA.

Schneiter, A.A. (ed.). 1997. Sunflower technology and production. Agron. Monogr. 35. ASA, CSSA and SSSA, Madison, WI, USA.

Tabatabai, C.T. Johnston, and M.E. Sumner (eds.). 1996. Methods of soil analysis. Part 3. SSSA Book Ser. 5. SSSA. Madison, WI, USA.

Taylor, B.N. 1995. Guide for the use of the Int. System of Units (SI). NIST Spec. Publ. 811. U.S. Gov. Print. Office, Washington, D.C., USA.

Wadleigh, C.H. 1968. Wastes in relation to agriculture and forestry. USDA Misc. Publ. 1065. US Gov. Print. Office, Washington, D.C., USA.

Westerman, R.L. (ed.). 1990. Soil testing and plant analysis (3rd Ed.). SSSA Book Ser. 3. SSSA, Madison, WI, USA.

ix. Conference, symposium or workshop proceedings and transactions

Ghafoor, A., M. Qadir and G. Murtaza. 1997. Potential for reusing low quality drainage water for soil amelioration and crop production. p. 411-420. *In:* A. Tariq and M. Latif (eds.) Proc. Int. Symp. Water for the 21st Century: Demand, Supply, Development and Socio-Environmental Issues. 17-19 June 1997, Lahore, Pakistan.

Holmes, J.W. (ed.). 1968. Trans. Int. Congr. Soil Sci., Adelaide. Elsevier, New York, NY, USA.

McGarry, D. 1992. Final report of the soil management training workshop, Dalby. 3-4 July 1991. Conf. and Workshop. Ser. QC92008. Dept. Primary Industries, Brisbane, QLD, Australia.

Muhammed, S. and A. Ghafoor. 1986. Reclamation of two saline-sodic soil series through subsoiling and gypsum application using marginal water for leaching p. 221-223. *In:* R. Ahmad and A.S. Pietro (eds.). Prospects for Biosaline Research. Proc. US-Pak. Biosaline Res. Workshop. 22-26 Sept. 1985, Univ. Karachi, Karachi, Pakistan.

x. Chapter in a book

Achom, P.P. and H.L. Balay. 1985. Developments in potassium fertilizer technology. p. 49-66. In R.D. Munson (ed.) Potassium in agriculture. ASA, Madison, WI, USA.

Gardner, W.H. 1986. Water content. p. 493-544. *In* A. Klute (ed.) Methods of soil analysis. Part 1 (2nd Ed.). Agron. Monogr. 9. ASA and SSSA, Madison, WI, USA.

Johnson, D.W. and D.E. Todd. 1998. Effects of harvesting intensity on forest productivity and soil carbon storage. p. 351-363. *In* R. Lal et al. (ed.) Management of carbon sequestration in soils. Adv. Soil Sci. CRC Press, Boca Raton, FL, USA.

Qureshi. R. H., A. Hassan and A. Ghafoor. 1994. Use of drainage water for halophyte production. p. 237-312. *In:* R. Choukr-Ullah, C.V. Malcolm and A. Hamdy (eds.) Halophytes and Biosaline Agriculture. Marcel Dekker, Inc., New York, NY, USA.

xi. Chapter in a proceedings volume

Cagirgan, M.I. and C. Token 1996. Path-coefficient analysis for grain yield and related characters under semiarid conditions in barley. p. 607-609. *In* A. Slinkard et al. (eds.) Proc. 5th Int. Barley Genet. Symp., Vol. 2. Univ. Saskatchewan Ext. Press, Saskatoon, SK, Canada.

Caviness, C.E. and F.C. Collins. 1985. Double cropping. p. 1032-1038. *In* R. Shibles (ed.) Proc. World Soybean Res. Conf., Ames. 12-17 Aug. 1984. Westview Press, Boulder, CO, USA.

Jansson. S.L. 1967. Soil organic matter and fertility. p. 1-10. *In* G.V. Jacks (ed.) Soil chemistry and fertility. Trans. Int. Soc. Soil Sci. 1966. Univ. Press, Aberdeen, Scotland.

Klausner, S.D. 1993. Mass nutrient balances on dairy farms. *In* Proc. Cornell Nutrition Conf. for Feed Manufacturers. 19-21 Oct. 1993. Cornell Univ., Ithaca, NY, USA.

Power, J.F. and V.O. Biederbeck. 1991. Role of cover crops in integrated crop production systems. p. 167-174. *In* W.L. Hargrove (ed.) Cover crops for clean water. Proc. Int. Conf., 9-11 April. Soil and Water Conserv. Soc., Ankeny, IA, USA.

xii. Dissertation or thesis

Endres, C. 1986. Influence of production practices on yield and morphology of *Amaranthus cruentus* and *Amaranthus hypochondriacus*. M.S. thesis, Dept. Agron., Univ. Arkansas, Fayetteville, AR, USA.

Kirkegaard, J.A. 1990. Effect of compaction on the growth of pigeon pea on clay soils. Ph.D. diss., Dept. Soil Sci., Univ. Queensland, St Lucia, Australia.

Murtaza, G. 1997. Charge characteristics of normal and salt-affected soils and their effects on Na-Ca exchange during reclamation. Ph.D. Thesis, Dept. Soil Sci., Univ. Agri., Faisalabad, Pakistan.

Pyle, M.E. 1982. A comparison of determinate and indeterminate soybean lines for double cropping in Virginia. Ph.D. diss., Virginia Polytechnic Inst. & State Univ., Blacksburg, VA, USA (Diss. Abstr. Int. 438:3095).

Schuster, A. 1987. The response of cotton to ammonium and nitrate in the irrigation solution (In Hebrew with English summary). M.S. thesis. Hebrew Univ. Jerusalem, Rehovot, Israel.

xiii. Abstracts

NB: Cite abstracts only until a more formal publication becomes available

Caldwell, B.A. 1997. Fatty acid esterase activity in forest soils and ectomycorrhizal mat communities. p. 223. Agron. Abstr. 1997. ASA, Madison, WI, USA.

Krishnamurthi, G.S.R. and P.M. Huang. 1991. The role of Al in Fe(II) transformation. p. 96. *In* Abstracts, Annual Meeting, Clay Minerals Soc., Houston, TX. 5-10 Oct. 1991. Clay Miner. Soc., Houston, TX, USA.

xiv. Software and software documentation

Abacus Concepts. 1991. Super ANOVA users guide. Release 1.11. Abacus Concepts, Berkeley, CA, USA.

Boone, K., D. Porter and J. McKinion. 1995. Rhizos-1991: A simulator of row crop rhizosphere. USDA ARS-113. USDA ARS Crop Simulation Res. Unit, Mississippi State, Stoneville, MS, USA.

Fick, G.W. 1981. ALSIM 1 (Level 2) user's manual. Agron. Mimeo 81-35. Dept. Agron.,

Cornell Univ., Ithaca, NY, USA.

SAS Institute. 1990. SAS user's guide: Statistics (4th Ed.). SAS Inst., Cary, NC, USA.

SAS Institute. 1994. The SAS system for Windows. Release 6.10. SAS Inst., Gary, NC, USA.

xv. Miscellaneous

Department publications, pamphlets, and other brief publications

ICRISAT. 1985. Pearl millet male-sterile line ICMA 2 and its maintainer line ICMB 2: Plant Material Description No. 5. ICRISAT, Patancheru, AP, India.

Sandsted, R.F. 1980. Naming and release of 'Midnight': A new black bean cultivar. Dept. Vegetable Crops Mimeo. Ser. VC-239. Cornell Univ., Ithaca, NY, USA.

Encyclopedia article

Salisbury, F.B. 1981. Response to photoperiod. p. 135-167. *In* O.L. Lange et al. (ed.) Physiological plant ecology: I. Responses to the physical environment. Encyclopedia of plant physiology. Vol. 12A. Springer-Verlag, Berlin, Germany.

Government documents

Pennsylvania Agricultural Statistics Service. 1993. Statistical summary and annual report. 1992-1993. PASS-102. Penn. Dept. Agri., Harrisburg, PA, USA.

Patents and plant patents

Dudeck, A.E. 1995. Bermuda grass plant 'FHB-135'. US Plant Patent 9030. Date issued 3 Jan. 1995.

Titcomb, S.T. and A.A. Juers. 1976. Reduced calorie bread and method of making same. US Patent 3 979 523. Date issued 7 Sept. 1976.

Performance and variety tests

Halseth, D.E., W.L. Hymes, R.W. Porter and R.L. MacLaury. 1996. 1995 New York State Dry Bean Variety Trials. Fruit and Vegetable Sci. Rep. 58. Cornell Univ., Ithaca. NY, USA.

Schapaugh, W.T. and K.L. Roozeboom. 1993. 1992 Kansas performance tests with soybean varieties. Agri. Expt. Stn. Rep. Prog. 673. Kansas State Univ., Manhattan, KS, USA.

Steadman, J.R., K.F. Grafton, K. Kmiecik, J.M. Kolkman, M. Kyle Jahn and R. Mainz. 1998. Bean white mold nursery, 1997. Annu. Rep. Bean Improv. Coop. 41:173-174.

Tyler, J. (ed.). 1994. The uniform soybean tests, Southern States 1995. USDA-ARS, Stoneville, MS, USA.

Printed publication with on-line edition and/or updates

University of California. 1996. UC IPM pest management guidelines: Tomato. UC-DANR Publ. 3339. (Available on-line with updates at http://www.ipm. ucdavis.edu/PMG/ selectnewpest.tomatoes.html).

Standards

ASAE (Am. Soc. Agric. Eng.). 1993. Manure production characteristics. Engineering Practice Subcommittee, ASAE Agri. Sanit. Waste Manage. Comm. ASAE Standard D384.1. ASAE, St. Joseph, MI, USA.

Supplements and special volumes

Hardy, R.W.R, R.C. Bums, R.R. Hebert, R.D. Holsten and E.K. Jackson. 1971. Biological nitrogen fixation: A key to world protein. p. 561-590. *In* T.A. Lie and E.G. Mulder (eds.) Biological nitrogen fixation in natural and agricultural habitats. Proc. Tech. Meet. Int. Biol. Programme (Sect. PP-N), Prague and Wageningen, 1970. Spec. Vol., Plant and Soil. Martinus Nijhoff, The Hague.

Young, W.C. 1991. Influence of row spacing and seeding rate on tall fescue seed production. J. Appl. Seed Prod. 9(suppl.):48.

On-line electronic sources

Treat electronic sources as you would the same kind of material in print, starting with the author, year, and title and then giving further information as for a chapter or journal article, but adding the essential on-line address URL and the date the information was posted or accessed or when the address was verified.

Electronic version only

DeVries. F.P., M. Jansen and K. Metalmark. 1995. Newsletter of Agro-Ecosystems Modeling [Online]. November extra Ed. Available by e-mail Listserv (camase-l@hern.nic.surfnet.nl) or Web link to http://www.bib.wau.nl/camase/cam-news.html (verified 1 Nov. 1996).

Downing, M., D. Langseth, R. Stoffel and T. Kroll. 1996. Large-scale hybrid poplar production economics: 1995 Alexandria, Minnesota, establishment cost and management [Online]. BIOENERGY 96. Proc. Natl. Bioenergy Conf., Partnerships to Develop and Apply Biomass Technologies, Nashville, TN. 15-20 Sept. 1996. Available at http://www.esd. oml.gov/bidp/papers/bioen96/downing.html (posted 10 Dec. 1996; verified 24 Nov. 1998).

National Agricultural Statistics Service. 1997. Crops county data [Online]. Available at http://usda.mannlib.comell.edu/data-sets/crops/9X100 (verified 30 Nov. 1998).

University of California. 1996. Tomato pest management guidelines. Univ. of Calif. Pest Management Guidelines Publ. 14. (Available on-line with updates at http://www.ipm. ucdavis.edu/PMG/selectnewpest.tomatoes. html. (Verified 30 Nov. 1998).

CD-ROM

Moore, K., and M. Collins (eds.). 1997. Forages, CD-ROM companion [CD-ROM computer file]. 5th Ed. Iowa State Univ. Press, Ames, IA, USA.

Agronomy Journal, Volumes 17-22, 1925-1930 [CD-ROM computer file]. ASA, Madison, WI and Natl. Agri. Libr., Madison, WI, USA (Nov. 1994).

g. Appendices

Appendices are generally included to help clarification and make readers understand statements in the main body of theses or dissertations. In addition, some times appendices are useful to support the interpretation of results. This becomes a record of data for different computations later by the author or the readers.

3. Page Numbering

Small Roman numerals must be used for the Preliminary section. The title page is understood to be 'i' but no number appears on this page. Arabic numerals begin with the first page of the body of thesis, but no number appears on this page. Numbering continues consecutively through the appendices. All the numbers, both Roman and Arabic, are printed 2.5 cm from the bottom of the paper flushed to the center of page. No punctuation is used with the page numbers. Headings or narratives end one 1.5 line space above the page number.

ON-LINE RESOURCES

It is difficult to describe all of the tools and techniques for searching the literature. It will, however, be quite helpful to identify some of these. In following a search strategy, it is important to be familiar with guides to library search. Most of the databases have lists of indexing terms for use in formulating search requests. A list of such selective electronic sources is presented below.

Library Catalogs and Databases
http://www.nal.usda.gov/isis/
telnet://opac.nal.usda.gov (Natl. Agri. Libr. catalog and journal citations: login "isis").

http://lcweb.loc.gov/z3950/gateway.html (Library of Congress WWW/Z39.50 Gateway; with links to other libraries).

http://lcsweb.lcspub.psu.edu/ (CIC Virtual Catalog: Search across multiple university library catalogs).

http://ww.w3.org/hypertext/DataSources/bySubject/Overview.html (The World-Wide Web Virtual Library: Subject Catalogue: a distributed database).

References
http://www.umi.com/hp/Products/Dissertations.htm (University Microfilms International; search for titles and dissertation abstracts numbers; an order is not required for a search).

http://www.uvm.edu/~ncrane/estyles/ (Web page for Li and Crane Electronic Styles: examples, principles, ordering information for the book).

Abstracts, Table of Contents
Abstracts and tables of contents are available for many journals, usually at the publisher's web site. Coverage may be limited to the current year, and rarely goes back earlier than 1996. For example, following sites yield access to the contents of several hundred scientific journals. (To see if a journal you want has on-line tables of contents or abstracts, try the publisher's home page. The NAL card catalog entry for a journal identifies the publisher, and an Internet search should locate the home page).

http://www.aic.ca/joumals/index.html (Agri. Inst. of Canada journals)

http://www.idealibrary.corn/glogin.htm (Int. Digital Electronic Access; tables of contents and abstracts for journals from Academic Press, W.B. Saunders and Churchill Livingstone).
http://www.blacksci.co.uk/products/joumals/jnltitle.htm (Blackwell journals).

http://www.springer-ny.com or http://www.springer.de (Springer-Verlag journals; journals of various publishers with electronic editions handled by Springer).

http://www.wkap.nl/kapis/cgi-bin/world/jmllist.htm?Jrnlhome (Kluwer journals)

Nomenclature: Plants, Pests and Soils
http://www.ars-grin.gov/npgs/searchgrin.html (scientific names of plants; crop registration; accessions; descriptors).

http://trident.ftc.nrcs.usda.gov/plants/plntmenu.html (Plants Database Access Table).

telnet://fungi.ars-grin.gov (Fungal pathogens; login "login user", password "user").

http://www.scisoc.org/resource/common/ (American Phytopathological Society: Common Names for Plant Diseases 1994, updated 1996).

http://pest.cabweb.org/GUEST/imidsind.htm (IMI descriptions of fungi and bacteria).

http://www.statlab.iastate.edu:80/soils/osd/ (National Official Soil Series Descriptions w/searches & FTP).

Patents and Plant Variety Protection
http://www.uspto.gov/patft/index.html (U.S. patents, including plant patents).

http://probe.nal.usda.gov:8000/related/aboutpvp.html (U.S. plant variety protection).

Geography
http://164.214.2.59/gns/html/index.html (USGS international).

Public Nima Gnps Query Form
http://mapping.usgs.gov/www/gnis/index.html [USGS Mapping Information: Geographic Names Information System, GNIS).

http://www-nmd.usgs.gov/www/gnis/gnisform.html (USGS Mapping Information: GNIS Data Base Query Form).

Scientific Societies
http://www.cast-science.org/society.htm (Council on Agricultural Science and Technology; CAST member societies, with links to most of them, including Agri. Inst. of Canada).

http://www.aic.ca/ (Am. Agri. Econ. Assoc.).

http://www.aaea.org/ : (Am. Assoc. Agri. Edu.).

http://www.ais.msstate.edu/AAAE/ (Am. Assoc. of Cereal Chemists).

http://www.scisoc.org/aacc/ (Am. Forage and Grassland Council).

http://www.forages.css.orst.edu/Organizations/Forage/AFGC/index.html (Am. Inst. Biol. Sci.).

http://www.aibs.org/core/index.html (Am. Oil Chemists' Soc.).

http://www.aocs.org/ (Am. Peanut Res. & Educ. Soc.).

http://clay.agr.okstate.edu/plantsoilsci/links/welcome.htm (Am. Phytopathol. Soc.).

http://www.scisoc.org/ (Am. Soc. Animal Sci.).

http://www.asas.uiuc.edu/ (Am. Soc. Plant Physiologists).

http://www.aspp.org/ (ASAE).

http://asae.6rg/ (Assoc. of Official Seed Analysts).

http://www.zianet.com/AOSA/ (Entomol. Soc. Am.).

http://www.entsoc.org/ (Soc. for Range Management).

http://www.srm.org/ (Soc. of Nematologists).

http://ianrwww.unl.edu/ianr/plntpath/nematode/son/sonhome.htm (WSSA).

SI Units and Conversion
http://physics.nist.gov/cuu/ (National Institute of Standards and Technology reference on constants, units, and uncertainty).

http://ts.nist.gov/ts/htdocs/200/202/mpo.reso.htm (Metric Internet links including conversion calculators).

SPECIFICATIONS FOR M.Sc., M.Phil. AND Ph.D. THESES

1. General Information

a. The thesis shall be prepared and bound on A-4 size, 90-100 g white paper on which the title of the thesis, author's name, and the year of submission, are to be superimposed in golden colour on the front/title page; the background colour will be black for M.Sc./M.Phil. and dark green for Ph.D. theses.

b. The title, chapter headings and table titles shall not have terminal punctuation.

c. Incorrectly divided words are not acceptable, e.g. clockwise but not clock-wise, reuse but not re-use, and winter-hardy but not winter hardy (refer to English Usage and Grammar).

d. The title on the thesis must be approved by the ASRB as per the synopsis.

e. Page numbers in Arabic numerals shall be situated in the center, 2.5 cm from the bottom of the paper except for the first page of major chapters.

f. There may be several methods of doing the same thing. Study the manual carefully because all documentation must conform to the standards prescribed.

g. The heading or title of rows and columns of a table are generally in singular form.

2. Typing Directions

a. Font No. and face: A font No. of 12 with Times New Romans Regular Font face be used.

b. Any special material to be included in the thesis as an "EXIBIT" must be prepared on the thesis paper unless there is special requirement to use other paper.

c. Striking over letters or words is not acceptable. No corrections by pen or pencil are to appear in the thesis.

d. Margins (Top, Bottom, Left, and Right) of about 2.5 cm are to be maintained.

e. The text must be typed on 1.5 line space and each full page must contain 25-30 lines.

f. The tables are to be typed on single line space.

g. The titles of tables, columns, rows and fig. must be typed on single space.

h. Always use the standard abbreviations, once spelled at the first place of appearance; if new abbreviation is coined, it must be followed consistently through out the text. It is advisable to prepare a list of abbreviations and place before the Acknowledgement.

i. The units of measurement as per the SI System of Units must be followed (Appendix VI).

j. The figures in a table must be uniform with respect to digits after decimal but this level may be different in different tables.

3. The Format of Thesis

Parts of Thesis: The parts of a thesis are to be arranged as follows:

a. Title Page: The title page must follow spacing and capitalization as sample page.

b. Certificate: This must be in the form of the attached sample.

c. Acknowledgement: It is optional. If given, should be realistic and brief. Lengthy, flattering remarks and undue appreciations are against the scientific traditions. Better to accommodate this section on one page, in general.

d. Table of Contents: It should have primarily chapters, sub-headings and sub-sub-headings only. Avoid too many details (Appendix 1).

e. List of Tables: It is essential part and be given in the format given at appendix 2.

f. List of Figures: It is required, if any Fig. are included (Appendix 3).

g. List of Plates/Photos: It is required, if any Photos are included (Appendix 3).

h. Main Body of Thesis. This comprises introduction, review of literature, materials and methods, results and discussion, conclusions, references and appendices.

i. Appendices. These should be included for the understanding of text (Appendix 4).

j. Name on the title page must be the same as it is on official documents of the student.

4. Illustrations

Illustrated material of full page size may be photographed on light weight photographic paper and inserted as a page of the thesis. The services of photography are generally available to students for the preparation of prints to be used in the thesis. Digital cameras for photographs and computer graphic software to draw graphs can be used, of which colour prints can be printed for thesis. Photographs, where dimensional measure or contrast is to be brought out should include a scale in its composition or a scale line, be drawn on photographs. The photograph should be impersonal representation of the material required to be duplicated.

The photos may be in glossy black but colour photo prints may also be used, and may be preferred in the case of photos of vegetation. Reproduction of material to be included in the thesis shall be prepared so as to produce clear black and white copy. Negative Photostats, ozalids, breuning and other process prints must be avoided. The scales on 'X' and 'Y' axis should be similar to have better comparison of graphs when more than one graphs pertaining to the same property are placed on one page, e.g. six graphs showing changes in SAR for five soil depths after harvest of each of the six crops.

5. Proof Reading

Mean symptom readings (Table 1 showed that *Avena sterilis* lines)
\# were mor resistant than the *A. sativa* checks and that the resistance was
transmitted to F1 and F_2 hybrids with Lamar. The dominance effects ~~were~~ **stet**
\# consistently smaller than thecumlative additive effects and did not differ u
signifi cantly from zero in six cases our of eight (Table 1). although these caps
results indicate that inheritance off resistance was determined predominantly
by additive gene action they should not be taken as proof that dominance was
not involved. In fact, the performances of the F_1's (Table 1, Fig 1) were not at
the midpoint between those of their parnts but were closer to those of the e
ital resistant A. sterilis parental lines, suggesting some dominance for resistance.

PROOFREADER'S MARKS

Mark	Meaning
^	Caret-something to be inserted; mark in text line
⊙	Period
^,	Comma
⊙ or /:	Colon
;/	Semicolon
'	Apostrophe
" / "	Quotations
= / or 1/H	Hyphen
(/)	Parentheses
[/]	Brackets
□	Indent one em, double for two em, and so on
1/M	One em dash (long dash)
1/N	One en dash (short dash)
1/H	Hyphen
⁀	Close up
stet	Let it stand, when something has been inadvertently crossed out. Dots under matter will usually suffice, but also include "stet" on margin to avoid misunderstanding.
	Delete-take out
	Delete and close up
X	Broken letters or defective type
¶	Paragraph
no ¶	No paragraph
wf	Wrong font
═	Capitals and Caps
═	Small capitals and sc
less #	Less space
#	Insert space
eq #	Equalize spacing
	Turn letter or line
	Move to left or to right
	Move up or move down
tr	Transpose
	Character to go around letters, words, or phrases to indicate that they are to be transposed. Always include "tr" on margin of proof.
lc	Lower case
	Superscript letter or figure
	Subscript letter or figure
ital	Italics and
rom	Roman
bf	Boldface
⑦	Circle around figures means spell out
(twenty)	Circle around word means
(grams)	Use figure or abbreviation.

(Sample Title Page)

EFFECTS OF DIFFERENT CULTURAL TREATMENTS ON MORPHOLOGICAL AND YIELD CHARACTERISTICS OF WHEAT CULTIVARS *(Triticum aestivum* L.*)*

BY

MOHAMMAD SAEED AHMAD

Thesis submitted in partial fulfillment of requirements for the degree of

MASTER OF SCIENCE
IN
AGRONOMY

FACULTY OF AGRICULTURE
UNIVERSITY OF AGRICULTURE
FAISALABAD, PAKISTAN

DECEMBER 2005

(Sample Certificate Page)

To

The Controller of Examinations,

The members of the Supervisory Committee find the thesis submitted by Mr. ----------
----- (*Registration No.*) satisfactory and recommend that it be processed for evaluation by the External Examiner(s) for the award of degree.

CHAIRMAN: ----------

MEMBER: ----------

MEMBER: ----------

SPECIAL MEMBER (Optional): ----------

PROCEDURE FOR SUBMISSION OF THESIS

The student may consult offices of the Director Advance Studies and Director Research to ensure that the thesis is in proper form while submitting paper (Soft) bound copy of semi-final thesis after defense seminar at university level. Later he/she will submit three paper bound copies of the M.Sc. thesis or Ph.D. dissertation including the original and two photocopies to the Controller of Examinations not later than the date specified by the authorities. An additional copy of the thesis is better to prepare and send to the agency if the scholar obtained financial assistance from any agency.

In case of genuine hardship where delay is caused by factors beyond human control, relaxation may be granted by the Vice Chancellor on the recommendation of the supervisor and Advance Studies and Research Board (ASRB).

After the receipt of thesis, the Controller of Examinations will arrange for its evaluation by the External Examiner(s). There is one national External Examiner for M.Sc. thesis evaluation, who is eminent scientist in his/her field, is not employee of the UAF and/or has no relationship with the candidate. An oral examination will be organized by the Chairman of the thesis supervisory committee after consultation with the nominated Examiner.

The Ph.D. dissertation will be evaluated by two External Examiners from technologically advanced countries, like USA, Canada, UK, Australia, Japan, Germany and France etc. as per directive of the Higher Education Commission (HEC) as uniform policy for all the degree awarding Institutes. The examiner is supposed to be a person of eminence, of high repute and of sound integrity, and a senior scientist.

The Controller of Examinations, after having received the award on the thesis, will send a copy of thesis to each of the University and Department Libraries. In addition, the thesis must conform to the standards laid down for this purpose by the ASRB and explained in GS-7.

SUGGESTED READINGS

American Forage and Grasslands Council, Forage and Grazing Terminology Committee. 1991. Terminology for grazing lands and grazing animals. Pocahontas Press, Blacksburg, VA,USA.

American Institute of Physics. 1990. AIP style manual (4th Ed.). Am. Inst. of Physics, New York, NY, USA.

American Mathematical Society. 1990. A manual for authors of mathematical papers. Am. Math. Soc., Providence, RI, USA.

American Phytopathological Society, Committee on Standardization of Common Names for Plant Diseases. 1994. Common names for plant diseases. APS Press, St. Paul, MN, USA.

American Society for Microbiology. 1991. ASM style manual for journals and books. Am. Soc. Microbiol., Washington, D.C., USA

American Society of Agricultural Engineers, Cultural Practices Equipment Committee. 1986. Terminology and definitions for agricultural tillage implements. p. 310-319. In R.H. Hahn and E.E. Rosentreter (eds.). ASAE Standards 1986. ASAE, St. Joseph, MI, USA.

American Society of Agronomy.1998. Publications handbook and style manual. ASA-CSSA-SSSA, Madison, WI, USA.

Awan, J.A. 2003. Scientific presentations. Unitech Communications, Faisalabad, Pakistan.

Bishop, C.T. 1984. How to edit a scientific journal. ISI Press, Philadelphia, PA, USA.

Booth, V. 1984. Communicating in science: Writing and speaking. Cambridge Univ. Press, New York, NY, USA.

Calvert, P. (ed.). 1990. The communicator's handbook: Techniques and technology. Agricultural Communicators in Education. Maupin House, Gainesville, FL, USA.

Campbell, G.S. and J. van Schilfgaarde. 1981. Use of SI units in soil physics. J. Agron. Educ. 10:73-74.

CBE (Council for Biology Editors). 1994. Scientific, style and format – The CBE Manual for authors, editors and publishers (6th Ed.). Cambridge Univ. Press, New York, NY, USA.

Cleveland, W.S. 1994. The elements of graphing data (2nd Ed.). AT&T Bell Laboratories, Murray Hill, NJ, USA.

Darmouth College's Committee on Sources. 1988. Sources: Their use and acknowledgment. Dartmouth College. Hanover, NH, USA.

Committee on the Conduct of Science. 1989. On being a scientist. National Academy of Sciences, Washington, D.C., USA.

Council of Biology Editors, Style Manual Committee. 1994. Scientific style and format: The CBE manual for authors, editors and publishers (6th Ed.). Cambridge Univ. Press, New York, NY, USA.

Dodd. J.S. (ed.). 1997. The ACS style guide: A manual for authors and editors (2nd Ed.). Am. Chem. Soc., Washington. D.C., USA.

Ebel, H.F, C. Bliefert and W.E. Russey. 1987. The art of scientific writing. VCH Publishers, New York, NY, USA.

Ghafoor, A., G. Murtaza and S.I. Hussain. 2006. Fundamentals of scientific communications and presentations. Allied Book Centre, Urdu Bazaar, Lahore, Pakistan

Lancashire. P.D., H. Bleiholder, T. van den Boom, P. Langelilddeke, R. Stauss, E. Weber and A. Witzenberger. 1991. A uniform decimal code for growth stages of crops and weeds. Ann. Appl. Biol. 119:561-601.

Li, X. and N.B. Crane. 1996. Electronic styles: A handbook for citing electronic information (Rev. Ed.). Information Today, Medford, NJ, USA.

Natural Resources Conservation Service. 1982-1996. National soil taxonomy handbook. Issues 1-9. USDA-NRCS. Washington, D.C., USA (Available on-line at http://www.stailab.iastale.edu/soils/nssh/; verified 1 Dec. 1998).

Petersen, R.G. 1977. Use and misuse of multiple comparison procedures. Agron. J. 69:205-208.

Rupnow, J.H., J.W. King and L.K. Johnson. 2001. Thinking verbally. Communication tips for technical presentations. Food Technol. 55:46-48.

Taylor, B.N. 1995. Guide for the use of the International System of Units (SI). NIST Spec. Publ. 811. Physics Lab., NIST, Gaithersburg, Madison, WI, USA.

University of Chicago Press. 1993. The Chicago manual of style (14th Ed.). Univ. Chicago Press, Chicago, IL, USA.

Zinsser, W. 1988a. On writing well (3rd Ed.). Harper & Row Publishers, New York, NY, USA.

Zinsser, W. 1988b. Writing to learn. Harper& Row Publishers, New York, NY, USA.

Appendix 1. Table of contents (Sample page)

TABLE OF CONTENTS

Appendix 2. List of tables (Sample page)

LIST OF TABLES

Appendix 3. List of figures and illustrations (Sample page)

LIST OF FIGURES

Appendix 4. List of appendices (Sample page)

LIST OF APPENDICES

Appendix 5. Abbreviations for literature citation and references

I. Abbreviated journal titles. Note that a single-word title is not abbreviated and does not end in a period.

AAPG Bull.
ABL Agri. Review.
Abstr., abstr. [Abstract(s), abstract]
Acad. [Academy]
Acta Agri. Scand.
Acta Chem. Scand.
Acta Crystallogr.
Acta Hortic.
Adv. [Advances]
Adv. Agron.
Adv. Appl. Microbiol.
Adv. Ecol. Res.
Adv. Front. Plant Sci.
Adv. Genet.
Adv. Lipid Res.
Adv. Microb. Ecol.
Adv. Soil Sci.
Adv. Water Resour.
Agri. Abstr. Bull.
Agri. Statist Pakistan.
Agri. [Agriculture, Agricultural]
Agri. Admin. Ext.
Agri. Biol. Chem.
Agri. Econ.
Agri. Econ. Res.
Agri. Econ. Tech. Bull.
Agri. Ecosyst. Environ.
Agri. Eng.
Agri. Environ.
Agri. Food Chem.
Agri. Food Sci.
Agri. For. Meteorol.
Agri. Hist.
Agri. Human Values
Agri. Meteorol.
Agri. Rev.
Agri. Syst.
Agri. Tec. (Santiago)
Agri. Venezie
Agridigest.
Agro Banker.
Agro Vet. News.
Agro. Ecosystems
Agrochem. Soil Sci.
Agrochemophysica
Agrochimica
Agro-Ecosystems
Agron. [Agronomy]
Agron. Abstr.
Agron. J.
Agron. Soc. N.Z. Annu. Rep.
Agronomie (Paris)
Agroplantae
AIChE (many related publications)
Alexandria J. Agric. Res.
Am. [America, American]
Am. Assoc. Pet. Geol. Bull.
Bull.
Am. Econ. Rev.
Am. J. Agric. Econ.
Am. J. Bot.
Am. J. Clin. Nutr.
Am. J. Enol. Vitic.
Am. J. Sci.
Am. J. Vet. Res.
Am. Lab.
Am. Midi. Nat.
Am. Mineral.
Am. Nat.
Am. Oil Chemists' Soc. Monogr.
Am. Soc. Surf. Min. Reclam.
Am. Soc. Test. Mater.
Am. Stat.
Anal. Biochem.
Anal. Chem.
Anal. Chim. Ada
Anal. Lett.
Anal. Methods Pestic. Plant Growth Regul.
Analyst (Amsterdam)

Angew. Bot.
Animal Feed Sci. Technol.
Animal Prod.
Ann. [Annals, Annales]
Ann. Agri. Fenn.
Ann. Agron.
Ann. Amelior. Plant.
Ann. Appl. Biol.
Ann. Arid Zone
Ann. Bot.
Ann. Geophys.
Ann. Inst. Slat. Math.
Ann. Math. Stat.
Ann. Microbiol.
Ann. NY Acad. Sci.
Ann. R. Agri. Coll. Swed.
Ann. Sci. For.
Annu. (Annual]
Annu. Rep. NMR Spectrosc.
Annu. Rev. Biochem.
Annu. Rev. Cell Biol.
Annu. Rev. Ecol. Syst.
Annu. Rev. Entomol.
Annu. Rev. Microbiol.
Annu. Rev. Phys. Chem.
Annu. Rev. Phytopathol.
Annu. Rev. Plant Physiol.
Antonie van Leeuwenhoek
Appl. Environ. Microbiol.
Appl. Geochem.
Appl. Magn. Reson.
Appl. Microbiol.
Appl. Microbiol. Biotechnol.
Appl. Phys. (Berlin)
Appl. Phys.
Appl. Phys. Lett.
Appl. Spectrosc.
Arch. [Archives]
Arch. Biochem. Biophys.
Arch. Environ. Contain. Toxicol.
Arch. Exp. Pathol. Pharmakol.
Arch. Forstwes.
Arct. Alp. Res.
Arid Zone Res.
Arkansas Farm. Res.
ARS [Agricultural Research Service]
As. [Asia, Asian]
ASA [Am. Soc. Agron.]
ASA Spec. Publ.
ASAE Publ.
Asian J. Plant Sci.
Assoc. [Association, Associates]
ASTM Spec. Tech. Publ.
At. [Atom, Atomic]
At. Spectrosc.
Atmos. Environ.
Atmos. Ocean
Aust J. Expt. Agri. Anim. Husb.
Aust. J. Agri. Res.
Aust. J. Biol. Sci.
Aust. J. Bot.
Aust. J. Chem.
Aust. J. Plant Physiol.
Aust. J. Sci. Res. Ser.
Aust. J. Soil Res.
Aust. Vet. J.
AZRC News.
Balochistan J. Agri. Sci.
Beitr. [Beitrage]
Beitr. Tabakforsch
Ber. Dtsch. Chem. Ges.
Better Crops Plant Food
Biochem. [Biochemie, Biochemistry, Biochemical]
Biochem. J.
Biochem. Physiol. Pflanz.
Biochem. Syst. Ecol.
Biochim. Biophys. Acta
Biochimie
Biodegradation
Biol. Agri. Horde.
Biol. Fertil. Soils
Biol. Membr.
Biol. Plant.
Biol. Res. J.
Biologia.
Biom. Bull.
Biometr. [Biometrical, Biometry]

Biometrics
Biometrika
Biophys. J.
Bioresour. Technol.
Biosci. Biotechnol. Biochem.
BioScience
Biotechnol.
Biotechnol. Prog.
Biotropica
Bodenkd. [Bodenkunde]
Bol. [Boletino]
Boll. [Bollettino]
Bot. [Botanical, Botany]
Bot. Gaz.
Bot. Mag.
Bot. Rev.
Boundary-Layer Meteorol.
Br. [British]
Br. J. Appl. Phys.
Bull. [Bulletin]
Bull. Ala. Agri. Expt. Stn. Auburn Univ.
Bull. Ala. Agri. Expt. Stn. Polytech. Inst.
Bull. Am. Meteorol. Soc.
Bull. Chem. Soc. Jpn.
Bull. Entomol. Soc. Am.
Bull. Environ. Contam. Toxicol.
Bull. Int. Assoc. Eng. Geol.
Bull. Rech. Agron. Gembloux
Bull. Torrey Bot. Club
Bull. Y. Tenn. Val. Auth. Natl. Pert. Dev. Cent.
Bull. Yale Univ. Sch. For.
Bull. Yale Univ. Sch. For. Environ. Stud.
Bull. Zoology.
Bur. [Bureau, Bureaux]
C.R. [Comptes Rendus]
C.R. Acad. Agri. Fr.
Calif. Agri.
Can. [Canada, Canadian, Canadien, Canadienne]
Can. Agri. Eng.
Can. Entomol.
Can. Geotech. J.
Can. J. Agri. Sci.
Can. J. Animal Sci.
Can. J. Biochem.
Can. J. Biochem. Physiol.
Can. J. Bot.
Can. J. Chem.
Can. J. Fish. Aquat. Sci.
Can. J. For. Res.
Can. J. Genet. Cytol.
Can. J. Microbiol.
Can. J. Phys.
Can. J. Plant Pathol.
Can. J. Plant Sci.
Can. J. Res. Sect.
Can. J. Soil Sci.
Can. J. Spectrosc.
Can. Min. Metall. Bull.
Can. Mineral.
Caryologia
Castanea
Catena
Cell
Cell Tissue Res.
Cell. Mol. Biol.
Cent. [Center(s), Centre(s), Central]
Cereal Chem.
Cereal Res. Commun.
Chem. [Chemistry, Chemical]
Chem. Abstr.
Chem. Engg. Sci.
Chem. Geol.
Chem. Phys. Lett.
Chem. Phys. Lipids
Chem. Rev.
Chemosphere
Chim. [Chimie]
Chron. Bot. Croat. Chem. Acta
Cienc. [Ciencia]
Cient. [Cientifica, Cientifico]
CIM Bull.
Clay Miner.
Clay Miner. Bull.

Clay Sci.
Clays Clay Miner.
Clays Clay Miner. Proc. Conf.
Clim. Change
Clim. Toxicol.
Collect. Czech. Chem. Commun.
Commun. [Communications]
Commun. Soil. Sci. Plant Anal.
Compost Sci.
Comput. [Computation, Computer, Computers, Computing]
Comput. Appl. Biosci.
Comput. Chem.
Comput. Electron. Agric.
Comput. Geosci.
Comput. J.
Comput. Phys. Commun.
Comstech News.
Commun. [Comunicaciones]
Conf. [Conference]
Congr. [Congress]
Conserv. [Conservation]
Contrib. [Contributions]
Contrib. Mineral. Petrol.
Cotistics.
Counc. [Council]
Crit. Rep. Appl. Chem.
Crit. Rev. Anal. Chem.
Crit. Rev. Biochem.
Crit. Rev. Biochem. Mol. Biol.
Crit. Rev. Biotechnol.
Crit. Rev. Environ. Control
Crit. Rev. Microbiol.
Crit. Rev. Plant Sci.
Croat. Chem. Acta
Crop Prot.
Crop Sci. Crit. Rev. Biochem. Mol. Biol.
Crops Soils
Cryobiology
CSREES [Cooperative State Res. Edu. and Extension Serv.]
CSSA [Crop Sci. Soc. Am.]
Curr. Biol.
Curr. Genet.
Curr. Microbiol.
Curr. Opin. Cell Biol.
Curr. Opin. Struct. Biol.
Curr. Sci.
Cytologia
Dairy Herd Manage.
Dept. [Department]
Dev. [Developments, Developmental]
Dev. Ind. Microbiol.
Dev. Review.
Discuss. Faraday Soc.
DNA Cell Biol.
Down Earth
Dtsch. [Deutsche, Deutsches]
Earth Surf. Processes
Earth Surf. Processes Landforms
East Afr. Agri. For. J.
East Afr. Wildl. J.
Ecol. Applic.
Ecol. Bull.
Ecol. Modell.
Ecol. Monogr.
Ecol. Stud.
Econ. Bot.
Econ. Dev. Cult. Change
Econ. Entomol.
Econ. Geol.
Econ. Review.
Econometrica
ed. [editor]
Ed. [Edition]
Educ. [Education, Educational]
Egypt. J. Soil Sci.
Electroanal. Chem.
EMBO J.
Emp. J Expt. Agri.
Engg. Geol.
Engg. Horizons.
Engg. News.
Engg. Review.
Entomol. [Entomological, Entomology]
Entomol. Expt. Appl.

Environ. [Environment, Environmental]
Environ. Biogeochem. Proc. Int. Symp.
Environ. Entomol.
Environ. Entomol. Expt. Agri.
Environ. Expt. Bot.
Environ. Geol. Water Sci.
Environ. Int.
Environ. Lett.
Environ. Pollut.
Environ. Sci. Technol.
Environ. Toxicol. Chem.
Enzymologia
Ergeb. [Ergebnisse]
Estuarine Coastal Mar. Sci.
Euphytica
Eur. [Europe, European]
Euras. [Eurasia, Eurasian]
Euras. Soil Sci.
Expt. Agri.
Expt. Cell Res.
Expt. Husb.
Faraday Discuss. Chem. Soc.
Farm Scientists
Farming Outlook
Farming S. Afr.
FEMS Microbiol. Ecol.
FEMS Microbiol. Immunol.
FEMS Microbiol. Lett.
FEMS Microbiol. Rev.
FEMS Symp.
Fert. [Fertilizer(s)]
Fertil. [Fertility]
Fert. Agric.
Fert. Res.
Fert. Rev.
Fert. Soils
Fert. Update
Field Crop Abstr.
Field Crops Res.
Fiziol. Rast.
Food Agri. Immunol.
For. Chron.
For. Ecol. Manage.
For. Sci.
For. [Forestry]
Frontier J. Agri. Res.
Fun-e-Zaraat
G. [Giomale]
Genet. [Genetic(s)]
Genetics
Genome
Geochem. Int.
Geochim. Cosmochim. Acta
Geoderma
Geogr. Rev.
Geol. [Geologica, Geological, Geology]
Geol. Mag.
Geol. Soc. Am. Bull.
Geol. Soc. Am. Spec. Pap.
Geology
Geophys. Res. Lett.
Geophysics
Geotech. Test. J.
Geotechnique
Gomal Univ. J. Res.
Govt. [Government]
Grass Forage Sci.
Ground Water
Ground Water Monit. Rev.
Handb. (Handbook]
Harv. For. Pap.
Hawaii Inst. Trop. Agric. Hum. Resour. Res. Ext. Ser.
Hawaii Plant. Rec.
Hazard. Waste
Health Phys.
Herb. Abstr.
Heredity
Hildgardia
Hort. [Horticulture. Horticultural]
Hort. Sci.
HortScience
Hydrobiologia
IAHS Publ.
IEEE Trans. Geosci. Remote Sens.

IEEE Trans. Nucl. Sci.
Ind. [Industrial, Industry]
Ind. Eng. Chem.
Ind. Eng. Chem. Anal. Ed.
Ind. Eng. Chem. Process Des. Dev.
Ind. Wastes
Indian [(no abbreviation)]
Indian J. Agric. Sci.
Indian J. Agron.
Indian J. Expt. Biol.
Indian J. Expt. Bot.
Indian J. Genet. Plant Breed.
Indian J. Pure Appl. Phys.
Ind. Develop.
Insect Biochem. Mol. Biol.
Insight.
Inst. [Institute. Institution]
Int. [International]
Int. Congr. Soil Sci. Trans.
Int. J. Agri. Biol.
Int. J. Environ. Anal. Chem.
Int. J. Heat Mass Transfer
Int. J. Poultry Sci.
Int. Mitt. Bodenkd.
Int. Rice Comm. Newsl.
Iowa State J. Res.
Irrig. Sci.
Islamabad J. Sci.
Islamic Thought & Sci. Creativity.
Isr. J. Agri. Res.
Isr. J. Bot.
Isr. J. Chem.
Issues Sci. Technol.
IWASRI News.
J. [Journal(s)]
J. Agri. Econ.
J. Agri. Eng. Res.
J. Agri. Food Chem.
J. Agri. Res.
J. Agri. Sci.
J. Agron. Crop Sci.
J. Agron. Educ.
J. Air. Pollut. Control Assoc.
J. Am. Chem. Soc.
J. Am. Soc. Agron.
J. Am. Soc. Hort. Sci.
J. Am. Soc. Sugar Beet Technol.
J. Am. Stat. Assoc.
J. Am. Vet. Med. Assoc.
J. Am. Water Works Assoc.
J. Anal. Appl. Pyrolysis
J. Anim. Sci.
J. Animal Health Prod.
J. Animal Pl. Sci.
J. Animal Vet. Adv.
J. Appl. Bacteriol.
J. Appl. Ecol.
J. Appl. Meteorol.
J. Appl. Phys.
J. Appl. Seed Prod.
J. Arboric.
J. Arid Environ.
J. Assoc. Off. Agri. Chem.
J. Assoc. Off. Anal. Chem.
J. Atmos. Chem.
J. Atmos. Sci.
J. Bacteriol.
J. Bioenerg.
J. Biol. Chem.
J. Biol. Sci.
J. Chem. Ecol.
J. Chem. Educ.
J. Chem. Phys.
J. Chem. Soc.
J. Chem. Soc. Chem. Commun.
J. Chem. Soc. Dalton Trans.
J. Chem. Soc. Faraday Trans.
J. Chem. Soc. Pakistan
J. Chromatogr.
J. Clim. Appl. Meteorol.
J. Colloid Interface Sci.
J. Colloid Sci.
J. Contam. Hydrol.
J. Coord. Chem.
J. Dairy Res.
J. Dairy Sci.
J. Develop. Studies
J. Drainage & Water Manage.

J. Drainage Recl.
J. Ecol.
J. Econ. Entomol.
J. Electroanal. Chem.
J. Engg. Appl. Sci.
J. Environ. Engg.
J. Environ. Qual.
J. Environ. Sci.
J. Environ. Sci. Health
J. Expt. Biol.
J. Expt. Bot.
J. Fert. Issues
J. Food Chem.
J. For.
J. Gen. Microbiol.
J. Gen. Virol.
J. Geol.
J. Geophys. Res.
J. Great Lakes Res.
J. Hered.
J. Hort. Sci.
J. Hydrol.
J. Indian Soc. Soil Sci.
J. Inf. Sci.
J. Inorg. Nucl. Chem.
J. Insect Physiol.
J. Int. Assoc. Math. Geol.
J. Mater.
J. Metereol.
J. Microbiol. Methods
J. Mol. Biol.
J. Natl. Inst. Agri. Bot.
J. Nematol.
J. Nutr.
J. Org. Chem.
J. Photochem.
J. Photochem. Photobiol.
J. Phys. Chem.
J. Phys. Colloid Chem.
J. Phys. Sci.
J. Plant Growth Regul.
J. Plant Nutr.
J. Plant Physiol.
J. Policy Model.
J. Prod. Agri.
J. Pure & Appl. Sci.
J. Range Manage.
J. Res. Punjab Agri. Univ.
J. Res. US Geol. Surv.
J. Rural Develop. Administ.
J. S. Afr. Bot.
J. Sci. Food Agri.
J. Sci. Instrum.
J. Sci. Technol.
J. Sci. Technol. Policy & Scientometrics
J. Sediment. Petrol.
J. Seed Technol.
J. Soc. Ind. Appl. Math.
J. Soil Sci.
J. Soil Water Conserv.
J. Sports Turf Res. Inst.
J. Theor. Biol.
J. Ultrastruct. Res.
J. Vac. Sci. Technol.
J. Virol.
J. Virol. Methods
J. Water Pollut. Control Fed.
J. Weather Modif.
J. Wildl. Manage.
Jpn. J. Breed.
Jpn. J. Crop Sci.
Jpn.[Japan. Japanese]
Kerala J. Vet Sci.
Lab. [Laboratoire. Laboratorio, Laboratory]
Landbauforsch. Voelkenrode
Landbauforsch. Voelkenrode Sonderh.
Landwirtsch. Forsch.
Langmuir
Lesovedenie
Lett. (Letter(s)
Limnol. Oceanogr.
Maize Genet. Coop. Newsl.
Mar. [Marine]
Mar. Chem.
Mass Spectrom. Rev.
Math. Biosci.

Meded. Landbouwhogesch.
Wageningen
Meded. Landbouwhogesch. Wageningen Univ. Res. J. Engg. Technol.
Mem. [Memoires. Memoirs. Memorias]
Meteorol. [Meteorology]
Methods Enzymol.
Methods Mol. Biol.
Microbiol. Ecol.
Min. [Mine(s). Mining, Miners]
Miner. [Mineral(s)]
Mineral. Mag.
Modern Agri.
Mol. [Molecular]
Mol. Biol.
Mol. Cell. Biochem.
Mol. Cell. Biol.
Mol. Gen. Genet.
Mol. Microbiol.
Mol. Plant-Microbe Interact.
Mol. Simul.
Monatsschr. [Monatsschrift]
Monogr. [Monograph(s)]
Monthly Agromet. Bull.
Monthly Stat. Bull.
Moscow Univ. Soil Sci. Bull.
Mycologia Mycotoxins
N.Z. J. Agri. Res.
N.Z. J. Bot.
N.Z. J. Expt. Agri.
N.Z. J. For. Sci.
N.Z. J. Sci.
N.Z. J. Sci. Technol.
N.Z. J. Soil Sci.
N.Z. J. Vet.
NACTA J.
Nat. [Nature. Natural, Naturelle, Naturalist(s)]
Natl. [National]
Natural History Bull.
Nature
Nematologica
Neth. J. Agric. Sci.
Neth. Nitrogen Tech. Bull.
Neth. Pert. Tech. Bull.
New Phytol.
News Bull.
Newsl. [Newsletter]
No. [Number]
North Cent. J. Agri. Econ.
Northeast Environ. Sci.
Northwest Sci.
NRCS [Natural Resources Conservation Service]
Nucl. [Nuclear, Nucleic]
Nucl. Sci. Abstr.
Nucleic Acids Res.
Nutr. Abstr. Rev.
Nutr. Rep. Int.
Oecol. Plant.
Oecologia
Ohio Farm Home Res.
Oleagineux
Org. Geochem.
Organ. [Organisation, Organization]
Outlook Agri.
Pakistan Atom
Pakistan Tobacco
Pakistan Vacuum
Pakistan Agri. Develop. Review
Pakistan Agri.
Pakistan Econ. Perspective
Pakistan Econ. Social Review
Pakistan Entomologist
Pakistan Environ. Digest
Pakistan Food Agri. Review
Pakistan Gulf Economist
Pakistan J. Agri.
Pakistan J. Agri. Econ.
Pakistan J. Agri. Res.
Pakistan J. Agri. Sci.
Pakistan J. Agri. Social Sci.
Pakistan J. Agri., Agri. Engg. Vet. Sci.
Pakistan J. Agron.
Pakistan J. Appl. Econ.
Pakistan J. Arid Agri.
Pakistan J. Biochem.
Pakistan J. Biochem. Molecular Biol.

Pakistan J. Biol. Sci.
Pakistan J. Bot.
Pakistan J. Entomol.
Pakistan J. Fisheries
Pakistan J. Food Sci.
Pakistan J. Hydrocarbon Res.
Pakistan J. Livestock Res.
Pakistan J. Marine Biol.
Pakistan J. Marine Sci.
Pakistan J. Nematol.
Pakistan J. Nutr.
Pakistan J. Phytopathol.
Pakistan J. Plant Pathol.
Pakistan J. Plant Sci.
Pakistan J. Sci.
Pakistan J. Sci. Ind. Res.
Pakistan J. Sci. Res.
Pakistan J. Statistics
Pakistan J. Vet. Res.
Pakistan J. Weed Sci. Res.
Pakistan J. Zool.
Pakistan Manage. Review
Pakistan Poultry
Pakistan Sci. Abstr.
Pakistan Sci. Bull.
Pakistan Seafood Digest
Pakistan Sugar J.
Pakistan Textile J.
Pakistan Vet. J.
Pb. Univ. J. Zool.
PCR Methods Appl.
Peanut Sci.
Pedobiologia
Pedologie
Pestic. [Pesticide(s)]
Pestic. Biochem. Physiol.
Pestic. Sci.
Philos. Trans. R. Soc. London
Photobiochem. Photobiophys.
Photochem. Photobiol.
Photogramm. Eng. Remote Sens.
Photosynth. Res.
Phys. Chem.
Phys. [Physical, Physics]
Phys. Chem.
Phys. Chem. Miner.
Phys. Earth Planet Inter.
Phys. Rev. Lett.
Physiol. [Physiological, Physiology]
Physiol. Plant Pathol.
Physiol. Plant.
Physiol. Veg.
Phytochem. Anal.
PINSTECH News & Views
Plant Breed.
Plant Breed. Rev.
Plant Cell
Plant Cell Environ.
Plant Cell Physiol.
Plant Cell Rep.
Plant Dis.
Plant Dis. Rep.
Plant Foods Hum. Nutr.
Plant Mol. Biol.
Plant Pathol.
Plant Physiol.
Plant Sci.
Plant Sci. Lett.
Plant Soil
Planta
Pochvovedenie
Popul. Environ. Bull.
Popul. Environ. Digest.
Port. Acta. Biol. Ser.
Potato Res.
Proc. [Proceedings]
Proc. Am. Forage Grassl. Conf.
Proc. Am. Soc. Animal Sci., South. Sec.
Proc. Am. Soc. Civ. Eng.
Proc. Am. Soc. Hort. Sci.
Proc. Arkansas Acad. Sci.
Proc. Assoc. Off. Seed Anal.
Proc. Breed. Weed Control Conf.
Proc. Crop Sci. Soc. Jpn.
Proc. Fluid Fert. Found. Symp.
Proc. Indian Acad. Sci.
Proc. Indiana Acad. Sci.

Proc. Int. Congr. Anim. Reprod. Artif Insem.
Proc. Int. Grassl. Congr.
Proc. Int. Seed Test. Assoc.
Proc. Int. Turf Res. Conf.
Proc. N.Z. Grassl. Assoc.
Proc. N.Z. Weed Pest Control Conf.
Proc. Natl. Acad. Sci.
Proc. Nutr. Soc.
Proc. Pakistan Acad. Sci.
Proc. Parasitol.
Proc. R. Soc. London
Proc. S.D. Acad. Sci.
Proc. Soc. Expt. Biol. Med.
Proc. Soil Crop Sci. Soc. Fla.
Proc. West. Soc. Weed Sci.
Prog. [Progress]
Prog. Nucleic Acid Res. Mol. Biol.
Progr. [Program, Programme]
Publ. [Publication(s), Publisher(s)]
Q. [Quarterly]
Q. J. R. Meteorol. Soc.
Q. Rev. Biol.
R. [Royal]
Radiocarbon
Reclam. Rev.
Reclam. Reveg. Res.
Records Zoological Survey of Pakistan
Remote Sens. Environ.
Rep. [Report(s), Reporter(s)]
Res. [Research]
Res. J. Water Pollut. Control Fed.
Res. Rep. North Cent. Weed Control Conf.
Reservoir.
Residue Rev.
Rev. [Review(s), Revista, Revue]
Rev. Chim.
Rev. Chim. Miner.
Rev. Mark. Agri. Econ.
Review of Foreign Trade
Rice J.
Riv. [Rivista]
S. Afr. J. Agri. Sci.
S. Afr. J. Plant Soil
Sarhad J. Agri.
Scanning Electron Microsc.
Sci Khyber
Sci. [Science(s), Scientific]
Sci. Agri.
Sci. Agri. Bohemoslov.
Sci. Agri. Sin.
Sci. Am.
Sci. Hort.
Sci. Industry
Sci. Technol in the Islamic World
Sci. Technol. Develop.
Sci. Total Environ.
Sci. Vision
Science
Scott. For.
SCS [Soil Conservation Service]
Seed Sci. Technol.
Sementi Elette
Ser. [Series]
Serv. [Service(s)]
Sindh Economist
Sindh J. Agri. Res.
Sindh Univ. Res. J.
Soc. [Societa, Societe, Society, Societies]
Soil Biol. Biochem.
Soil Bur. Bull. N.Z.
Soil Crop Sci. Soc. Fla. Proc.
Soil Res.
Soil Sci.
Soil Sci. Plant Nutr.
Soil Sci. Soc. Am. J.
Soil Sci. Soc. Am. Proc.
Soil Surv. Horiz.
Soil Tillage Res.
Soil Use Manage.
Soils Fert.
Sorghum Newsl.
South J. Appl. For.
South. Coop. Ser. Bull.
South. J. Agri. Econ.

Southeast. Geol.
Sov. Plant Physiol.
Sov. Soil Sci.
Soybean Digest
Soybean Genet. Newsl.
Space Horizons
Spec. [Special]
Spectrochim. Acta
Spectrom. [Spectrometry]
Stn. [Station(s)]
Struct. Bonding
Stud. [Studies]
Stud. Environ. Sci.
Stud. Succ.
Sulphur Agri.
Sulphur Inst. J.
SUPARCO Times
Swed. J. Agri. Res.
Symp. [Symposium]
Syst. Zool.
Tappi. J.
Tech. [Technical, Technique(s)]
Technol. [Technology, Technological]
Technol. Window.
Technometrics
Tellus
Tenn. Farm Home Sci.
Tenn. Val. Auth. Chem. Engg. Bull.
Tenn. Val. Auth. Chem. Eng. Rep.
The Nucleus
The Pakistan Cotton
The Pakistan Develop. Review
The Pakistan J. Forestry
The Seed News
Theriogenology
Tobacco Statistical Bull.
Tohoku J. Agri. Res.
Toxicol. Environ. Chem.
Trans. [Transactions]
Trans. Am. Geophys. Union
Trans. ASAE
Trans. ASME, J. Heat Transfer
Trans. Br. Mycol. Soc.
Trans. Faraday Soc.
Trans. Int. Congr. Soil Sci.
Trans. Kans. Acad. Sci.
Tree Physiol.
Trop. Agri.
Trop. Animal Prod.
Trop. Pest Manage.
Trop. Sci.
TVA [Tennessee Valley Authority]
UBL Econ. J.
Ultramicroscopy
USDA [US Dept. Agri.]
USEPA [US Environ. Protection Agency]
Versl. Landbouwkd. Onderz.
Vol. [Volume]
Waste Manage Res.
Wastes Engg.
Water Air Soil Pollut.
Water Environ. Res.
Water Pollut. Res. J. Can.
Water Res.
Water Resour. Bull.
Water Resour. Bull.
Water Resour. Invest. Rep.
Water Resour. Rep.
Water Resour. Res.
Water Sci. Technol.
Weed Res.
Weed Sci.
World Anim. Rev.
Z. [Zeitschrift]
Z. Acker- Pflanzenbau
Z. Anorg. Allg. Chem.
Z. Geomorphol.
Z. Kulturtech.
Z. Kulturtech. Flurbereinig.
Z. Naturforsch., A: Phys. Sci.
Z. Naturforsch., B: Chem. Sci.
Z. Naturforsch.. C: Biosci.
Z. Pflanzenemaehr. Bodenkd.
Z. Pflanzenkrankh. Pflanzenpathol. Pflanzenschutz.
Z. Pflanzenkrankh. Pflanzenschutz.

Z. Pflanzenphysiol.
Z. Pflanzenzuecht.
Z. Bakteriol. Parasitenkd.
Zootec. Nutr

Appendix 6. Conversion factors for SI and non-SI units

To convert column 1 into column 2, multiply by	Column 1 SI Unit	Column 2 non-SI Units	To convert column 2 into column 1, multiply by
Length			
0.621	kilometer, km (10^3 m)	mile, mi	1.609
1.094	meter, m	yard, yd	0.914
3.28	meter, m	foot, ft	0.304
1.0	micrometer, µm (10^{-6} m)	micron, µ	1.0
3.94×10^{-2}	millimeter, mm (10^{-3} m)	inch, in	25.4
10	nanometer, nm (10^{-9} m)	Angstrom, Å	0.1
Area			
2.47	hectare, ha	acre	0.405
247	Sq. km, km^2 $(10^3 m)^2$	acre	4.05×10^{-3}
0.386	Sq. km, km^2 $(10^3 m)^2$	square mile, mi^2	2.590
2.47×10^{-4}	square meter, m^2	acre	4.05×10^3
10.76	square meter, m^2	square foot, ft^2	9.29×10^{-2}
1.55×10^{-3}	Sq. millimeter, mm^2 $(10^{-3} m)^2$	square inch, in^2	645
Volume			
9.73×10^{-3}	cubic meter, m^3	acre-inch	102.8
35.3	cubic meter, m^3	cubic foot, ft^3	2.83×10^{-2}
6.10×10^4	cubic meter, m^3	cubic inch, in^3	1.64×10^{-5}
2.84×10^{-2}	liter, L (10^{-3} m^3)	bushel, bu	35.24
1.057	liter, L (10^{-3} m^3)	quart (liquid), qt	0.946
3.53×10^{-2}	liter, L (10^{-3} m^3)	cubic foot, ft^3	28.3
0.265	liter, L (10^{-3} m^3)	gallon	3.78
33.78	liter, L (10^{-3} m^3)	ounce (fluid), oz	2.96×10^{-2}
2.11	liter, L (10^{-3} m^3)	pint (fluid), pt	0.473
Mass			
2.20×10^{-3}	gram, g (10^{-3} kg)	pound, lb	454
3.52×10^{-2}	gram, g (10^{-3} kg)	ounce (avdp), oz	28.4
2.205	kilogram, kg	pound, lb	0.454
0.01	kilogram, kg	quintal (metric), q	100
1.10×10^{-3}	kilogram, kg	ton (2000 lb), ton	907
1.102	mega gram, Mg (tonne)	ton (US), ton	0.907
1.102	tonne, t	ton (US), ton	0.907
Yield and Rate			
0.893	kilogram per hectare, kg ha^{-1}	pound per acre, lb $acre^{-1}$	1.12
7.77×10^{-2}	kilogram per cubic meter, kg m^{-3}	pound per bushel, lb bu^{-1}	12.87
1.49×10^{-2}	kilogram per hectare, kg ha^{-1}	bushel per acre, 60 lb	67.19
1.59×10^{-2}	kilogram per hectare, kg ha^{-1}	bushel per acre, 56 lb	62.71
1.86×10^{-2}	kilogram per hectare, kg ha^{-1}	bushel per acre, 48 lb	53.75
0.107	liter per hectare, L ha^{-1}	gallon per acre	9.35
893	tonne per hectare, t ha^{-1}	pound per acre, lb $acre^{-1}$	1.12×10^{-3}
893	megagram per hectare, Mg ha^{-1}	pound per acre, lb $acre^{-1}$	1.12×10^{-3}
0.446	mega gram per hectare, Mg ha^{-1}	ton (2000 lb) $acre^{-1}$	2.24
2.24	meter per second, m s^{-1}	mile per hour	0.447

Specific Surface			
10	square meter per kilogram, $m^2\ kg^{-1}$	square centimeter per gram, $cm^2\ g^{-1}$	0.1
1000	square meter per kilogram, $m^2\ kg^{-1}$	square millimeter per gram, $mm^2\ g^{-1}$	0.001
Pressure			
9.90	mega pascal, MPa (10^6 Pa)	atmosphere	0.101
10	mega pascal, MPa (10^6 Pa)	bar	0.1
1.00	mega gram per cubic meter, Mg m^{-3}	gram per cubic centimeter, g cm^{-3}	1.00
2.09×10^{-2}	Pascal, Pa	pound per square foot, lb ft^{-2}	47.9
1.45×10^{-4}	Pascal, Pa	pound per square inch, lb in^{-2}	6.90×10^3
Temperature			
1.0(K–273)	kelvin, K	Celsius, °C	1.00(°C+27 3)
(9/5°C)+ 32	Celsius, °C	Fahrenheit, °F	5/9(°F - 32)
Energy, Work, Quantity of heat			
9.52×10^{-4}	Joule, J	British thermal unit, Btu	1.05×10^3
0.239	Joule, J	calorie, cal	4.19
10^7	Joule, J	erg	10^{-7}
0.735	Joule, J	foot-pound	1.36
2.387×10^{-5}	Joule per square meter, J m^{-2}	calorie per square centimeter (Langley)	4.19×10^4
10^5	Newton, N	dyne	10^{-5}
1.43×10^{-3}	Watt per square meter, W m^{-2}	calorie per square centimeter minute (irradiance), cal cm^{-2} min^{-1}	698
Transpiration and Photosynthesis			
3.60×10^{-2}	milligram per square meter second, mg $m^{-2}\ s^{-1}$	gram per square decimeter hour, g dm^{-2} h^{-1}	27.8
5.56×10^{-3}	milligram (H_2O) per square meter second, mg $m^{-2}\ s^{-1}$	micromole (H_2O) per square centimeter second, µmol $cm^{-2}\ s^{-1}$	180
10^{-4}	milligram per square meter second, mg $m^{-2}\ s^{-1}$	milligram per square centimeter second, mg $cm^{-2}\ s^{-1}$	10^4
35.97	milligram per square meter second, mg $m^{-2}\ s^{-1}$	milligram per square decimeter hour, mg $dm^{-2}\ h^{-1}$	2.78×10^{-2}
Plane Angle			
57.3	radian, rad	degrees (angle), °	1.75×10^{-2}
Electrical Conductivity, Electricity, and Magnetism			
10	siemen per meter, S m^{-1}	millimho per centimeter, mmho cm^{-1}	0.1
10^4	tesla, T	gauss, G	10^{-4}
Water Measurement			
9.73×10^{-3}	cubic meter, m^3	acre-inch, acre-in	102.8
9.81×10^{-3}	cubic meter per hour, $m^3\ h^{-1}$	cubic foot per second,	101.9

		$ft^3 s^{-1}$	
4.40	cubic meter per hour, $m^3 h^{-1}$	US gallon per minute, gal min^{-1}	0.227
8.11	hectare meter, ha m	acre-foot, acre-ft	0.123
97.28	hectare meter, ha m	acre-inch, acre-in	1.03×10^{-2}
8.1×10^{-2}	hectare centimeter, ha cm	acre-foot, acre-ft	12.33
Concentration			
1	Centimol per kilogram, cmol kg^{-1}	milliequivalent per 100 grams, me 100 g^{-1}	1
0.1	gram per kilogram, g kg^{-1}	per cent, %	10
1	milligram per kilogram, mg kg^{-1}	parts per million, ppm	1
Radioactivity			
2.7×10^{-11}	becquerel, Bq	curie, Ci	3.7×10^{10}
2.7×10^{-2}	becquerel per kilogram, Bq kg^{-1}	picocurie per gram, pCi g^{-1}	37
100	gray, Gy (absorbed dose)	rad, rd	0.01
100	sievert, Sv (equivalent dose)	rem (roentgen equivalent man)	0.01
Plant Nutrient Conversion			
	Elemental	*Oxide*	
2.29	P	P_2O_5	0.437
1.20	K	K_2O	0.830
1.39	Ca	CaO	0.715
1.66	Mg	MgO	0.602

CORIGENDUM

Page	Line	Printed	Correct
05	15th under References	give	Given
23	27 under Introduction	lead	Led
37	09	Anim.	Animal
42	02	*L.)*	L.)
39	21	comprises of	Comprises
51	39	Anim.	Animal
51	40	Anim.	Animal
52	04	Pl.	Plant
52	11	Anim.	Animal
53	41	Anim.	Animal
56	41	Anim.	Animal
56	43	Pl.	Plant
58	44	Pl.	Plant
59	17	Zoology	Zool.
59	29	Photosymh.	Photosynth.
59	31	Anim.	Animal
61	17	Anim.	Animal
61	31	Anim.	Animal
62	1st column heading	olumn	Column
62	4th under volume	bushel, but	bushel, bu
62	2nd under Mass	avid	avdp
62	6th under Mass	tone	tonne
63	1st & 2nd under Pressure	Mpa	MPa
63	3rd under Pressure	mega grams	mega gram
63	3rd under energy ---	Erg	erg
64	1st under Concentration	centimol	centimol
Units after the name of a scientist with first letter in upper or lower case is acceptable in SI system but abbreviation always starts with upper case letter. However, the first letter in upper case for unit name may be preferred.			