**Aims and components of MSc thesis work**

In MSc thesis research you carry out your own scientific research project. This has four aims:

* to acquire general academic skills
* to learn how to do scientific research
* to collect and interpret results on a specific research topic of your own choice
* to contribute to the increase of scientific knowledge.

The thesis research includes:

* formulation of a research question or hypothesis
* gaining specific knowledge which you need for the research (literature study)
* making an experimental design and a work plan
* performing an experimental study (laboratory, pot and/or field work and/or computer modelling)
* arrangement, analysis and interpretation of the results
* drawing conclusions
* writing a thesis and/or scientific publication(s)
* oral presentation of your results (colloquium).

**Getting started**

When you have decided to do a thesis-subject at our group, you make an appointment with the teaching co-ordinator Mrs Ans Hofman, tel. 0317 484084, e-mail: ans.hofman@wur.nl. If necessary she will help you to make contact with your supervisor.

The secretariat will hand out the thesis contract. Both student and supervisor sign this contract, registering commitments regarding MSc thesis work. Among others, commitments are made on frequency of supervision meetings.

**Supervisor**

Your supervisor is an expert member of the scientific staff of the Centre for Crop Systems Analysis, or of the institute where you perform your thesis work. When you wish to co-operate in a current PhD research, the PhD student will normally be your supervisor. It is the supervisor's responsibility to keep your work in good progress. This means that he/she will

* introduce you to other members of the department whom you will meet during your research work
* introduce you into the subject
* take care of some literature to start with (see Appendix 1: “Handling literature references” for practical instructions!)
* tell you where your working place is
* make a time schedule together with you
* take care that you will get admission to the necessary facilities
* discuss the results with you
* discuss your draft report and your colloquium
* be present during your examination.

A good working relationship with your supervisor is a prerequisite for a good co-operation. When you encounter problems with your supervisor, please discuss these immediately with him/her. When this does not help, you can ask another member of the department to assist.

**Prerequisites for a thesis**

Specific preliminary knowledge is necessary to start MSc thesis work efficiently. There is no general rule for all students. The prerequisites depend on the thesis you do. You can make a choice between:

- Thesis Crop and Weed Ecology: CSA-80418 up to CSA-80439 18-39 ETCS

- Thesis Crop Physiology: CSA-80918 up to CSA-80939 18-39 ECTS

Depending on the MSc thesis project additional prerequisites may be formulated. This is to be determined by the supervisor and examiner.

**Colloquia and Seminars**

During your period as an MSc thesis student, you are supposed to attend the colloquia of other thesis students and seminars of staff members. Announcements are made by e-mail. Students who work on a thesis for more than 26 ECTS have to follow 8 colloquia or seminars. Students with a thesis up to 26 ECTS have to attend 5. This mainly is to broaden your view on the scientific field. You can also learn how to give a colloquium yourself by listening to others. You have to register the colloquia you have attended yourself.

You are also expected to give a colloquium on your own research work. This oral presentation informs interested persons and members of the department and colleague students about your research results. Besides, an oral presentation of your results is important as a practical training. (See Appendix 2 “How to give a colloquium?” for practical instructions). The date of your presentation should be agreed upon with your supervisor, examiner and the secretariat. An appointment for the colloquium should be made in time with the secretariat, tel: (4)85315.

**Examination**

An oral examination concludes your thesis work. At least two weeks before the final examination a definitive report has to be handed in in duplicate to the supervisor. One for the supervisor and one for the examiner. During the examination the research project will be discussed following your thesis. You are expected to be able to explain and defend your results and conclusions. At the end of the examination the mark will be given.

 The following items are evaluated (according to the standard form 'Thesis evaluation Wageningen University'):

1. Research and competence (30-60%)

* Commitment and perseverance
* Initiative and creativity
* Independence
* Efficiency in working with data
* Handling supervisor's comments and development of research skills
* Keeping to the time schedule

2. Thesis report (30-60%)

* Relevance research, clearness goals, delineation research
* Theoretical underpinning,use of literature
* Use of methods and data
* Critical reflection on the research performed (discussion)
* Clarity of conclusions and recommendations
* Writing skills

3. Colloquium (5%)

* Graphical presentation
* Verbal presentation and defence

4. Examination (5%)

* Defence of the thesis
* Knowledge of study domain

**Work and house rules**

For your work at the department there are some house rules, which you have to obey strictly. The rules were developed to make sure that the available facilities could optimally be used.

* A printer that can be used for free by our thesis students is available in our building. Information on this and more will be sent to you by the secretariat. You will also be put on the student mailing list of the group, so you will receive e-mails about colloquia etc. Moreover, the secretariat will inform you for which thesis ring you are registered. When there are problems with computers, contacts with ICT have to go through the supervisor.
* At the end of the thesis project, a PDF version of the final report plus original data must be submitted.
* Expenses for the research will be paid by the chair group (via the supervisor).
* Opening hours building: Monday – Friday from 7.30 – 17.00 h.

 In special cases it is possible to enter the building in the evening (until 22.00 h) and/or weekends (from 9.00 – 17.00 h). Please ask permission from your supervisor.

**Appendix 1: Handling literature references**

You begin your research by reading literature and continue with that until the end. Your supervisor will provide you with the first scientific papers. After that, you will have to investigate yourself. You are strongly advised to create your own literature database using the programme Endnote.

 You can search for articles in scientific journals in the databases available on the library web site: <http://library.wur.nl/>. Use for instance 'Scopus' or 'Web of Science' (see Most used resources).

**Appendix 2: How to give a colloquium?**

As with any other aspect of your thesis work, you can ask your supervisor for advice in preparing your seminar. You also should ask him/her to attend a rehearsal and comment.

**Preparation**

Whenever you start preparing a presentation it is good to ask yourself some preliminary questions:

* Why do I give this presentation, what is the occasion?
* What do I want to achieve with my presentation? What are my objectives?
* What kind of audience will I have?
* What do I consider most important about my topic? What are my priorities?
* What is my 'take-home message'?
* How much time do I have for my talk?

**The set-up of your colloquium**

* The starting point for any oral presentation is a clear set-up, like: Introduction – Research Question or Hypothesis or Aim – Materials & Methods – Results & Discussion – Conclusions.
* Any other set-up is okay, as long as the research question/aim of your work and conclusions are explicitly put forward. However, for inexperienced speakers, another set up is not recommended.
* It is absolutely necessary to present your research question/hypothesis/aim in a key phrase on a slide. Whenever possible, use PowerPoint!
* Summarize the bottom line at the end, coming back to the research question/hypothesis/aim presented in the introduction. End with the ‘take-home-message’.
* Make sure your presentation does not last longer than 30 minutes. Therefore you have to practise (aloud!) before. If your rehearsal lasts too long, cut out information. You don’t have to present everything you did. However, keep the presentation consistent (don’t draw conclusions on results which are not presented).

**The use of slides**

You need to use slides in order to make sure that the audience can follow your line of reasoning. Take care of the following:

* Download and use the “huisstijl” PowerPoint template from Intranet (Information for staff) or contact your supervisor on what template to use.
* Slides are only useful if the audience can read them. Check this in advance in the back of the room you will use. Use large, bold letters (for instance: News Gothic or Arial, preferable font size 24. Minimal font size: 20). Never use upper case only. Use *italics* for emphasis.
* Don’t use too many slides. For each slide you need at least one minute.
* Don’t put too much information on one slide. Only show relevant information. Reduce large tables to maximally 12 numbers and 3 or 4 rows and columns. Don't add elaborate table headings. Figures and Tables from your thesis generally have to be edited before making them suitable for an oral presentation!
* Only use keywords, not sentences. Make sure the audience is listening and not reading!
* Make sure the slides support your talk, and not the other way around.

**Your presentation**

* Speak up loudly, not monotonously, show your enthusiasm. Use short sentences.
* Make sure everybody can read your slides, don’t stand in front of them.
* Never turn your back to the audience, address them directly, and keep eye contact. Do not talk to the screen!
* Do not stay in the same position all the time. Do not put your hands in your trousers-pocket (!), but use them instead to emphasise what you are saying.
* Rehearse at least twice aloud, so that you do not need to think about how to formulate sentences during the presentation. This prevents “eh"s, and is necessary to make sure you do not exceed 30 minutes.
* Take care everything is functioning by the time your presentation is supposed to start. So be there well in advance.

**Nerves**

It is absolutely normal to be nervous. You even have to be nervous for a good performance! Do realise that also experienced speakers are nervous before a presentation. Try to appreciate the state of being nervous as a state of being sharp and focussed.

It is absolutely not necessary to be extremely nervous. You are the expert on the topic presented. The audience is there because of interest in your topic, not to tackle you. You are to create the right atmosphere: a well-prepared presentation shows your respect for the audience and creates the positive, lively atmosphere needed for a fruitful discussion of your results. In contrast, a sloppy, disorderly, indistinct presentation that lasts too long mainly causes irritation. So if everything is well prepared, nothing can go wrong!

**Appendix 3: Directions for writing a thesis**

The data and results arising from your research project must be made available for more than just the researcher and his team. It is therefore essential that you write a well-ordered and readable report.

The thesis has a standard layout. The style of writing should be business-like, avoiding elaborate and lengthy sentences.

It will be a very good exercise to write the report in English. Foreign researchers or students can use the results and it is possible to use the report at foreign job applications. An English report should have a Dutch résumé as well. A Dutch report should have also an English résumé. If the English language skills will inhibit a good report, the report can be written in Dutch.

A thesis report is usually constructed as follows:

**Cover**

With title (this should be short, it must include essential information concerning the research), name author, research group and date (month and year).

**Title page**

With title, name author(s), supervisor(s) and examiner(s), research group + postal address,, kind of thesis (code) and date.

**Table of Contents**

Make sure to list all that follows in the Table of contents, including the appendices.

**Summary**

Very short overview of the research, the factors investigated and the results. The aim of the summary is to offer the reader quick information about the main theme of the research. For this reason, it must be possible to read the summary independently of the thesis itself. You can write the summary best at the end.

**Introduction**

The framework within which the research is carried out is sketched in the introduction, followed by an account of the background of the problem and why it is considered important to carry out further research.

 Make sure your experiment follows logically from the introduction

* Background, background problem and why that is important.
* Analysis of the problem or a specific part of the problem, including literature search. This should already point towards a certain direction of research. Identify what is known and what is not yet known.
* Scientific problem or hypothesis
* Research aim, as specific as possible. The aim should follow from what you wrote earlier and will be the basis for your discussion.

**Materials and Methods**

The way in which the research is carried out is described here. The results of the research are very much determined by the experimental set-up, the conditions under which the trial is performed and the way in which it is carried out. It is therefore extremely important to describe the set-up and implementation very carefully. For a good overview it is advisable to divide this chapter into a number of sections. What these sections are usually depends on the nature of the research. For example:

* Experimental set-up. Here the factors with their variants are described, as well as the way in which various treatments are realized, which experimental design is used, and when and where the experiment was carried out.
* Cultural practices and conditions. Here the information must be given about several factors, even if they are not included as factors in the trial, because they could significantly affect the results (soil tillage, sowing date, row distances, average climatological conditions, experimental techniques).
* Measurements, observations and calculations, harvesting procedure, sampling methods, chemical analysis, drying methods etc.
* Statistical analysis, the way in which this was performed must be explained for each of the variables.

**Results**

The author’s task now is to present the results of an experiment as clearly as possible. This is commonly done using tables and or figures, in which the author, via the text, illustrates the important effects by referring the reader to the table or figure concerned and, if necessary, offers further explanation. Make a systematic, logical and helpful subdivision of the results chapter into sections.

Whether to present the results in figure or table form largely depends on the nature of the numerical data. The advantage of a figure is that it is usually easy to interpret. It is essential in a research report, that when the experimental results are presented in a figure, the original data are mentioned in a table in an appendix. This is necessary because the results of this experiment are more likely going to be published with the results of other trials in a trade journal or in a scientific journal.

**Discussion**

The discussion is usually the most difficult part of the report, because you tend to focus on the results section and don’t know what to add in the discussion. You must be able to comment your own research results. What are the limitations of the experimental method used? What is the general validity of the experimental results and how do they compare with what is known already? Do the results agree with those of other reports or do they contradict them? Is there an explanation why these results agree or not agree with previous work? Are there theories to be considered to explain why the observed phenomena or processes occur? Take care: the discussion is certainly not a repeat of the experimental results, but is a critical assessment which should be kept short.

 The following are the major items to be treated in the discussion

* The achievement of the aim. Tell if and to what extent your aim was achieved and show from which data the reader can conclude that. Compare with literature. Don’t be discouraged when your results were not like expected. This is also extremely important.
* The explanation of your findings. Couple the most important findings with other parameters observed (e.g. explain yield from light interception etc.) and knowledge from literature.
* Implications. Tell what the findings mean for the research field and practice (your background problem in the introduction).

**Conclusions**

The results and the discussion lead to one or more conclusions that can be drawn from the research. Try to summarize them in a few concise sentences. An even better idea is to list them step-by-step.

**Recommendations for further research**

Sometimes recommendations for further research can be suggested in a separate chapter.

**References**

Alphabetical list (of authors’ names) of all the sources of literature used in the report (books, articles from journals, proceedings of congresses, etc.).

**Appendices**

Appendices should include the experimental lay-out, information of all further relevant information not yet provided, daily weather data, original experimental data, statistical analysis, and the exact data from figures. They may also include drawings and results which are either of too little importance or too detailed to be well presented in the report itself.