Paper Number and Title: 285711 Integrated Pest Management

Credits value: 30  Semester: 1112

Campus: Manawatu  Mode: Internal and Distance

Calendar Prescription:
Integrated management of arthropod pests, including recent developments of philosophy and principles; biological control by natural enemies, biopesticides, biotechnology and cultural practices; use of pesticides and pesticide resistance management; host plant resistance; use of pheromones; extension and implementation of integrated pest management.

Pre-requisites: Graduate Status and Permission Academic Director
Co-requisites: 171.763

E-Learning Category:

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Office: AH3.35
Email: Q.Wang@massey.ac.nz  Phone: 06 350 4831

Learning Outcomes:
Upon completion of this paper, students are expected to be able to discuss with confidence:
1. Historical development of IPM philosophy, principles and methods
2. Ecological aspects of IPM
3. Extension and implementation of IPM
4. Role of pesticides in IPM and pesticide resistance management
5. Role of biocontrol and pheromones in IPM
6. New technology for IPM and biosecurity
7. Host plant resistance and cultural practices and their roles in IPM
8. IPM case studies in New Zealand and overseas

Alignment of Assessment to Learning outcomes

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<tr>
<th>Assessment Description</th>
<th>Learning Outcomes Assessed</th>
<th>Contribution to Paper Mark</th>
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<tr>
<td>Assignment 1</td>
<td>1 2 3 4 5 6 7 8</td>
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<td>Assignment 2</td>
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<td>Project 1</td>
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<td>Project 2</td>
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<tr>
<td>Final exam</td>
<td>1 2 3 4 5 6 7 8</td>
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Assessments and Deadlines

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Due Date / Deadline</th>
<th>Late Penalty</th>
<th>Paper completion requirement</th>
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<tbody>
<tr>
<td>Assignment 1</td>
<td>15 April</td>
<td>10% deducted for every working day late</td>
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<td>Assignment 2</td>
<td>27 May</td>
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<td>Assignment 3</td>
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<td>Project 1</td>
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<td>Project 2</td>
<td>21 October</td>
<td>10% deducted for every working day late</td>
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<td>Final exam</td>
<td>4 November</td>
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<td>compulsory</td>
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The turnaround time for assignments will be no more than three weeks from the due date. It is important to note that the specified timeframe applies only to those assignments submitted by the due date, and does not necessarily apply to those submitted late.

Additional Requirements for Paper Completion
See Appendix One

Conditions for Aegrotat Pass and Impaired Performance:
If you are prevented by illness, injury or serious crisis from attending an examination (or completing an element of assessment by the due date), or if you consider that your performance has been seriously impaired by such circumstances, you may apply for aegrotat or impaired performance consideration. You must apply on the form available from the Examinations Office, the Student Health Service or the Student Counseling Service.

To qualify for an aegrotat pass on the final examination, you must have attempted at least 40% of the total formal assessment and your performance must be well above the minimum pass standard, so that the examiners can be confident that you would have passed the paper if you had completed the final examination. You may also apply for aegrotat consideration for other compulsory assessment elements (such as Semester Tests) that occur at a fixed time and place if you are prevented by illness, injury or a serious crisis from attending.

Plagiarism:
Massey University, College of Sciences, has taken a firm stance on plagiarism and any form of cheating. Plagiarism is the copying or paraphrasing of another person’s work, whether published or unpublished, without clearly acknowledging it. It includes copying the work of other students. Plagiarism will be
penalized; it is likely to lead to loss of marks for that item of assessment and may lead to an automatic failing grade for the paper and/or exclusion from reenrollment at the University.

**Grievance Procedures:**
A student who claims that he/she has sustained academic disadvantage as a result of the actions of a University staff member should use the University Grievance Procedures. Students, whenever practicable, should in the first instance approach the University staff member concerned. If the grievance is unresolved with the staff member concerned, the student should then contact the College of Sciences office on his/her campus for further information on the procedures, or read the procedures in the University Calendar.

**Appendix A**

**REQUIREMENTS TO SUCCESSFULLY COMPLETE THE PAPER:**

For assignments, choose three of the eight topics listed in the Learning Outcomes to focus on. You should also have knowledge of the remaining topics for the final examination, which may cover all 8 topics. The report should include Introduction, and a series of sections, and end up with Discussion or Conclusion. For each assignment report, DO NOT exceed 10 printed pages (point 12 font and 1.5 space) including references. Format for references cited in the text and reference list must be consistent. You can follow the format of any entomology journal.

For projects, choose two of the following to work on. For each project report, DO NOT exceed 15 printed pages (point 12 font and 1.5 space) including references. Each report should have a title and a series of subtitles including an introduction.

1. **A critical discussion on important issues in IPM**
   
   Read the paper "Whitaker, P. (1998) Important issues in ecologically sound integrated pest management. American Entomologist 44:148-165" (see me for a copy if you can not get access to the journal) and other relevant papers (you need to find these), and then write a critical discussion on wide issues in modern IPM, such as theories, techniques, implementation, public expectations, and government policies.

2. **Case studies (choose one only)**
   
   For one insect or mite pest listed below, make a web search from Massey page on the net (CAB 1975-2010), read the literature found and write a literature review of that pest -- current understanding of its biology, ecology, behaviour, pest management strategies, and in terms of research in these areas, what needs to be done. Please write this in the way like the literature review chapter of a Masters thesis.

   European red mite (*Panonychus ulmi* (Kock)), or
   Twospotted spider mite (*Tetranychus urticae* Kock), or
   Codling moth (*Cydia pomonella* (L.)), or
   Diamonback moth (*Plutella xylostella* (L.)), or
   Grass grub (*Costelytra zealandica* (White)), or
Longtailed mealy bug (*Pseudococcus longispinus* (Targioni-Tozzetti), or
An important arthropod pest of your choice

3. IPM extension and public understanding

Write an article (2500-3000 words) suitable for publication in a New Zealand newspaper or magazine (should be sent to one of the newspapers or magazines for consideration for publication). The article should be interesting to and suitable for the public who have little knowledge of IPM. It should deliver general information of IPM aiming to educate the public in terms of food quality and safety, biodiversity, environment, and other aspects you can think of. You can use examples from overseas, NZ and even from Massey University. Read the article listed below (Caldwell et al. 2000 in American Entomologist) for information on how to establish and improve communications of scientists and extension specialists with media in order to increase public awareness and acceptance of IPM.

Final examination will be essay-styled (two hours) and six questions will be asked but you will be required to choose and answer four of them.

STUDENT TIME BUDGET:

The total time students should spend on this paper is 375 hours, i.e. 30 weeks at 12.5 hours per week. It includes time in preparing for assessments and reports, and time scheduled by the student him/herself.

TEXTBOOK AND OTHER RECOMMENDED READING:

Suggested key references (you need to find more when preparing assignments) are listed below for your study. Please note that you are NOT required to read all those listed. Please select relevant papers and book chapters and find more references via Massey University Website-Library and other websites when preparing your assignments and project reports. Most journal articles can be downloaded via Massey University Library website (such as E-Journals).

1. **Historical development of IPM philosophy, principles and methods**


2. Ecological aspects of IPM


3. Pesticides’ role in IPM and pesticide resistance management

4. Extension and implementation of IPM


5. Role of biological control and pheromones in IPM


Follett, P.A., Duan, J., Messing, R.H., and Jones, V.P. (2000) Parasitoid drift after biological control introductions: re-examining pandora’s box. American Entomologist 46:82-94. (let me know if you can not find this)


6. **New technology for IPM and biosecurity**


7. **Host plant resistance and cultural practices and their role in IPM**


8. Some IPM case studies


University of California (1991) IPM for citrus. UC Statewide IPM project Publication 3304


TIMETABLE:

Unscheduled.

ADDITIONAL INFORMATION AND ADVICE:

Upon completion of this paper, you would appreciate that IPM is a systematic and integrated pest control approach where a team instead of an individual is required. Therefore, as an individual,
do not expect to run an IPM program without collaborators. If you want to become a researcher in IPM, you may focus on one or two areas of entomological research relevant to IPM, such as insect behavioural ecology, population ecology, chemical ecology, physiology, insect-plant interactions, biodiversity, biosystematics, molecular genetics, biological control, etc. In the Entomology and IPM Laboratory (AH324, AH318 and AH335) at the Massey University Institute of Natural Resources, we have facilities for those that are interested in higher degrees in insect biosystematics/biogeography, behavioural ecology, chemical ecology and biological control. For further information about our research and financial support, please visit http://plant-protection.massey.ac.nz/qwang/. If you are interested to be a consultant in IPM, you may need to participate in various research programs, field days, take short training courses, and establish relationships with growers, researchers and IPM equipment, chemical and biocontrol companies. I will be happy to discuss IPM and those follow-up issues with you.