
Sustainable Nutrient Management in New Zealand Agriculture

Intermediate Level Course Outline – Orchard & Arable Option

Controller:	Fertilizer and Lime Research Centre (Massey University)
Availability:	Extramural study plus a three day contact course offered to groups (20-30 persons) as demand dictates
Location:	At Massey University, Palmerston North or at other venues by arrangement.
Delivery mode:	Extramural reading assignment plus a three day contact course

Updated June 2013

Aim:	To provide students with a working knowledge of the assessment of nutrient requirements of orchard and arable production systems with consideration of best practices for environmental protection.
Entry requirements:	Participants should have completed at least one tertiary level course in Soil Science or Land Resource Management or have practical/professional experience of a standard acceptable to the course controller.
Course requirement:	Pre-course reading will involve approximately 40 hours of study and completion of a pre-course assignment. Participants must attend all class sessions and pass a two-hour examination on the final day.
Course prescription:	A comprehensive study guide plus a series of lectures and participatory computer aided classes focussing on the knowledge and skills required to achieve a high standard of sustainable nutrient management in common New Zealand orchard and arable production systems, including tree, vine, vegetable and cropping.

The Orchard and Arable option includes the following information modules:

- Horticulture and Water Quality – Defining the Issue
- Basic Components of Nutrient Requirement
- Nutrients and Nutrient Cycles
- Nutrient Demand of Fruit Crops
- Nutrient Demand of Arable Crops
- Contaminants in Fertilisers and Agrichemicals
- Nutrient Transfer to the Aquatic Environment
- Sustainable Nutrient Management
- Diagnostics: Soil and Plant Testing
- Overseer® Nutrient Budgets

Case Studies are conducted to familiarise participants with:

- *The theory and current practice of determining nutrient and fertiliser recommendations (with extensive use of the Overseer[®] Nutrient Budgets software),*
- *Estimating nutrient losses from horticultural systems and their impacts on the wider environment,*
- *The influences of fertilisers on soil quality,*
- *Indicators used to assess nutrient status in soil, plants, water and atmosphere.*

Learning outcomes: The course makes frequent references to the *Resource Management Act, Code of Practice for Nutrient Management and the Fertmark and Spreadmark schemes.*

On completion of the course the participants will:

Know the theoretical basis on which the current Code of Practice for Nutrient Management is based.

Be able to use and interpret the outputs from the decision support software Overseer[®] Nutrient Budgets.

Be able to use the knowledge on soil processes, fertiliser technology and the impacts of fertiliser use to critically assess options for sustainable nutrient management in a range of horticultural systems.

Certification: Successful participants will receive a Massey University 'Certificate of Completion' in Sustainable Nutrient Management in New Zealand Agriculture and have their achievement added to the official student records at Massey University.

Assessment: A two- hour written examination at the end of the three-day contact course comprises 100% of the course marks.

Requirements to successfully complete the paper:

Attend all sessions of the three- day contact course and obtain a minimum of a C grade (> 50% exam mark) in the course examination.

Learning Programme and Schedule:

Six weeks prior to the contact course, a comprehensive study guide and instructions are supplied. It is considered appropriate that participants would spend up to 40 hours studying the course notes, completing a pre-course assignment and loading case study information to the Overseer software in order to be prepared for the contact course. The lecture material reinforces learning of key sections of the study guide and allows hands-on experience and explanation of using the nutrient budgeting software on case study information.

Credit to other tertiary Qualifications:

The 'Certificate of Completion' is a recognised University achievement. A student may wish to have the work completed on this course (40 hrs private study plus 20 hrs lectures and workshops) credited towards either an undergraduate or postgraduate paper in Soil Science offered by Massey University. This can be achieved by enrolling in the appropriate paper and applying for credit to the course controller for the work completed in this short course. Further details can be solicited from Professor M J Hedley.

Intermediate SNM contact course

Orchard & Arable Option

PROVISIONAL PROGRAMME

Day One

Time	Major Topic	Contents Brief
8.30 – 9.00	Welcome to the course	<ul style="list-style-type: none"> • Introduction <ul style="list-style-type: none"> ○ <i>The tutors and the participants</i> ○ <i>The course objectives and outline</i>
9.00-10.00	Crop and vine phenology and nutrient demand	<ul style="list-style-type: none"> • The creation of nutrient demand • Crop phenological stages and nutrient demand • Structure, storage, bud bust, fruit set
10.30-12.30	Soil-plant-nutrient cycles and diagnostics	<ul style="list-style-type: none"> • Nutrient cycles in production systems <ul style="list-style-type: none"> ○ <i>N, P, K and S</i> ○ <i>Amounts and forms of nutrients</i> • Key soil processes • Nutrient sources <ul style="list-style-type: none"> ○ <i>Fertilisers, by-products, manures and composts</i>
1.30 - 3.15	Nutrient transfer to the aquatic environment	<ul style="list-style-type: none"> • Soils, drainage and runoff <ul style="list-style-type: none"> ○ <i>Soil management</i> ○ <i>Water management</i> ○ <i>Transport pathways</i> ○ <i>Diffuse and point sources</i> ○ <i>Irrigation</i>
3.45 - 5.15	Impacts of horticultural production on water quality	<ul style="list-style-type: none"> • Legislative and regulatory framework • Quantifying effects on water quality
6.30pm -	Workshop Dinner	

Day Two

Time	Major Topic	Contents Brief
8.30 – 9.30	Nitrogen management with arable and vegetable crops	<ul style="list-style-type: none"> • Growth, uptake and loss of nutrients for arable crops • Strategies to avoid nutrient loss
9.30 - 10.30	Orchard nutrient management	<ul style="list-style-type: none"> • Tree and vine crops • Inter-row management • Tools for nutrient management
11.00 – 12.00	Overseer Nutrient Budgets: Introducing case studies for trees and vines	<ul style="list-style-type: none"> • Data sources • Data entry • Budget interpretation
1.00 - 2.00	Overseer Nutrient Budgets: Introducing case studies for arable crops	<ul style="list-style-type: none"> • Data sources • Data entry • Budget interpretation
2.00 – 5.00	CONCURRENT CASE STUDY SESSIONS	
	1. Nutrient management with pipfruit, stonefruit and vines	<ul style="list-style-type: none"> • Factors that affect nutrient recovery • Strategies to improve sustainability • Overseer case studies
	2. Nutrient management with field crops and vegetables	<ul style="list-style-type: none"> • Overseer case studies <ul style="list-style-type: none"> ○ <i>Arable</i> ○ <i>Vegetable</i>

Day Three

Time	Major Topic	Contents Brief
8.30-9.30	Nutrient efficiency in arable systems	<ul style="list-style-type: none"> • Combined case studies wrap-up
9.30 - 10.30	Contaminants in fertilisers and agrichemicals	<ul style="list-style-type: none"> • Fertiliser F and Cd • Agrichemical Cu
11.00 - 12.00	A review of course material	<ul style="list-style-type: none"> • Theory and practice review • Free time
12.45 - 3.00	Assessment	<ul style="list-style-type: none"> • 2 hour examination <ul style="list-style-type: none"> ○ <i>Case study interpretation</i> ○ <i>Study guide and lecture material</i>