Programma per il corso 2-6 May 2011

Plant Physiology and the Growth of Fruit Crops

(Metodi e modelli applicativi ai sistemi Agro-ambientali – Modulo metodi Biologici -International PhD "Crop Systems, Forestry and Environmental Sciences")

Founded by the Ministry of Education, University and Research (MUR) program "rientro cervelli" **D.M. n. 18 DEL 01 FEBBRAIO 2005** *Coordinator: Prof. Bartolomeo Dichio*

Dr Alexander (Sandy) Lang

Biographical

- Born and educated UK (BSc, PhD London University)
- CSIRO Australia (1975-1980)
- DSIR New Zealand (1980-1990)
- HortResearch New Zealand (1990-2002)
- Sandy Lang Ltd (2002-2011)

Activity

- Science writing (grower manuals for sustainable production)
- Collaborative research (University of Basilicata)
- English language support for ESL researchers www.Rescript.co.nz

Research fields

- Phloem and xylem transport physiology
- Plant water relations
- Fruit physiology and fruit mineral nutrition
- Fruit skin and flesh-texture properties
- Sustainable production.

Contact

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Location:
Lectures will be in meeting room of Department of Scienze dei Sistemi Colturali, Forestali e dell'Ambiente

Times:
The lectures will be delivered in a 1-week block. The generous intervals between lectures will allow for coffee/lunch breaks but also for informal discussion.

Time	Mon 2	Tue 3	Wed 4	Thu 5	Fri 6
09.00-10.00	-	**5**	**9**	**15**	**19**
10.00-11:00		tutorial	tutorial	tutorial	tutorial
11.00-12.00	-	**6**	**10**	**16**	**20**
13.30-14.30	**1,2,3**	**7**	**11**	**17**	tutorial-
14:30-15:30	tutorial	tutorial	tutorial	tutorial	tutorial
15.30-16.30	**4**	**8**	**12,13,14**	**18**	tutorial-
16.30-17:30	tutorial	tutorial	tutorial	tutorial	tutorial

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Language
The lectures will be in English (I will speak slowly). Presentation will be informal with interruption for questions and comments welcomed.

Content
The course will offer a personal perspective on research areas in which I have been involved

The twenty lectures

1 **Introduction:** Acknowledgements, biographical, this course.

2 **The essence of research:** What is (and isn't) scientific research.

3 **The essence of a scientific paper:** What is (and isn't) important.

4 **The xylem 1:** Water uptake from the soil and water transport in the plant.

5 **The xylem 2:** Xylem function and dysfunction is normal. Methods to measure these properties.

6 **The phloem 1:** History of phloem research. The basics of phloem structure, phloem function, and phloem evolution. Serious problems with translocation mechanism as presented in textbooks.

7 **The phloem 2:** More problems with classical translocation hypotheses. An alternative hypothesis is presented and justified.

8 **The phloem 3:** Ways in which plants drive and control phloem translocation to speed phloem sap flow over long distances and to

direct phloem sap flow away from low-priority growth to high-priority growth.

9 **Flowering and fruit set in grapes 1:** Variable fruit set is a serious problem in wine-grape production. How is fruit set regulated? We look at the physiology of fruit set.

10 **Flowering and fruit set in grapes 2:** Traditionally, grapes are grown in small blocks with other grape cultivars closely adjacent. In modern viticulture huge areas are planted in a single clone. It is possible that some out-crossing is required in wine grapes and this modern practice may impact fruit set. A study is described that throws light on the physiology of fruit set.

11 **Rain cracking:** Many fruit crack in wet weather - stone fruit and berry fruit are especially susceptible. What are the properties of fruit skin that determines their susceptibility to rain cracking? A study in sweet cherries is described.

12 **Seed set and fruit shape in apple:** A study is described that quantifies the role of asymmetrical seed set in the development of misshapen apple fruit.

13 **Some physiological effects of mulch:** The use of plastic mulches is common to conserve water and minimise weed growth. This also has implications for soil health, for the uptake of soil minerals, for tree growth and for fruit quality.

14 **Reducing mouldy core in apples:** The recent adoption of “green” horticultural methods can have a negative impact on fruit quality. A study on these negative effects is presented and some tips given to avoid the problem of mouldy core.

15 **Xylem dysfunction in kiwifruit:** In most fruit, calcium nutrition is strongly affected by a progressive dysfunction of their internal xylem due to growth stretching. A joint study is presented on kiwifruit (conducted in NZ with U. Basilicata and U. Pisa)

16 **Mineral distribution in kiwifruit:** Standard pomological measures indicate axial gradients in mineral composition within a kiwifruit. Are these gradients responsible for fruit tissue breakdown in storage – or are these results very misleading...!

17 **Measuring air content in fruit:** Fruit respiration and fruit texture depend on fruit air content. A simple, cheap, but very accurate method for measuring the air content of small plant tissue samples is

described. (Homework – before this lecture study *Archimedes Principle*).

18 **Plant growth and temperature:** Unlike us, plants live at the temperature of their surroundings. Their rates of growth depend on this temperature. I will describe the standard way used to predict plant growth rate and crop production from meteorological records of temperature.

19 **Plant growth and the weather:** Ongoing research at U. Basilicata. Plant growth integrates fluctuations in the weather and these fluctuations leave their mark in plant structure. If the 'language syntax' is properly understood, it is possible to 'read' plant structure so as to infer past weather events – going back as far as many 1,000s of years - or perhaps going back only 20 minutes...!

20 **Fruit and calcium and quality:** Ongoing research at U. Basilicata. Fruit are low-calcium organs compared to leaves, stems and roots. Most commercial fruit species suffer low-calcium, tissue-breakdown disorders. These 'physiological' disorders are very costly in the production train as fruit must store and travel very well to meet today's consumer demands for out-of-season and different-climate fruit. Why are fruit low calcium organs? What can be done to raise fruit calcium? A better understanding of the physiology of fruit calcium nutrition suggests ways for increasing fruit calcium and fruit storage quality.

For more information:

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Accommodations su Potenza

Tourist Hotel www.touristhotelpotenza.com
Via Vescovado, 4
85100 Potenza (PZ)
0971 35418
Informazioni indicative
hotel tre stelle disponibilità delle stanze singola: 45 euro, doppia 70euro; località: centro

Grande Albergo www.grandealbergopotenza.it
46, C. 18 Agosto, 1860
85100 Potenza (PZ)
0971 410220
Informazioni indicative
albergo 4 stelle, singola. 70 E doppia:90 euro
località: centro

Istituto Principe Di Piemonte - maps.google.it
Via Piemonte, 36
85100 Potenza (PZ)
0971 444140
0971 426111
Informazioni indicative
25 euro a notte. Località : nei pressi dell'università

Park Hotel www.parkhotelpotenza.com
Raccordo Autostradale Basentana Potenza
85100 Potenza (PZ)
0971 472204
Informazioni indicative
4 stelle singola:65 euro, doppia: 95