



Welcome to the IPFN Newsletter

Dr. Nigel Brunton

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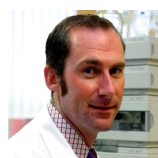
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Visit our webpage for [news](#) on:

- European Science Foundation Grants for Conferences to be held in 2011
- Bursaries of the Phytochemical Society of Europe
- EFSA awards with health claim to tomato extract.
- Controversy around anti-oxidants in Tea in the UK.



Dear Reader, welcome to the Irish Phytochemical Food Network Newsletter.

This Newsletter will be issued on a 6 month basis and will help to promote interaction among Network members as well as to disseminate the activities of Network towards different audiences (scientific, food industry and general public). The Irish Phytochemical Food Network is a team building initiative funded by the Department of Agriculture Fisheries and Food under the Food Institutional Research Measure.

Phytochemicals are natural occurring compounds from plants which may have a positive impact on human health. Phytochemicals are present in fruits and vegetables and therefore available in our diet. Nowadays consumers are becoming aware of the impact of food components on their health. Yet our full understanding of the mechanism of action and the fate of these compounds along the food chain is missing. Therefore the IPFN has adopted a 'farm to fork' approach which requires a wide variety of skills and knowledge and this is reflected in the expertise of the network members.

In the current issue Dr. Michael Gaffney and Dr. Kim Reilly outline their planned research at Teagasc Kinsealy Research Centre aimed at understanding how agronomic practices impact on phytochemical levels in Irish vegetables. David O'Beirne from University of Limerick addresses the issue of how processing affects phytochemical levels (antioxidants) in fruits and vegetables. In addition, Dublin Institute of Technology researchers describe some initial results from a project aimed at looking at the potential of Bramley's Seedling apple peel as a protection against cardiovascular diseases. Consumer acceptance and awareness of healthy compounds in foods is also of paramount importance and in the current issue Dr. Maeve Henchion head of the Marketing unit at AFRC in conjunction with Bridin McIntyre outline some of the implications for the fruit and vegetable sector of the health and wellness market.

Enjoy the reading !

Dr. Nigel Brunton, coordinator of the IPFN Initiative.



The **Irish Phytochemical Food Network** was set up in February 2008 and it is funded by the Department of Agriculture and Food through the Network and Team Building Initiative of the Food Institutional Research Measure (FIRM Ref. Num. 06/NITARFC6).

The Network is integrated by:

Teagasc



UCC



UCD



UL



NUIG



DIT





Agricultural Systems and Phytochemicals

Dr. Kim Reilly and Mr. Michael Gaffney



Organic produce is generally considered by consumers as “healthier”, but few studies to date have examined phytochemical content in organic and conventional crops, particularly for field vegetable crops. Some data does suggest increased levels of phytochemicals in organically grown crops and some scientists have suggested that phytochemicals could be considerably higher in organic vegetables.

Researchers at Teagasc Kinsealy are carrying out field trials to study the effect of agronomic practices on phytochemical accumulation in three vegetable crops of economic

importance in Ireland which contain important phytochemical compounds. One of these trials will examine the effect of cultivation practices typical of either conventional or organic agriculture.

The Kinsealy Systems Comparison Trial was initiated in Spring 2009 on a fresh field site and is planned to run initially over at least 5 years to allow one complete rotation. The systems to be compared are divided into component parts. Thus, “organic agriculture” is divided into an “organic soil treatment” including practices such as crop rotation, organic fertilization, winter cover crop etc. The “organic pest control” treatment uses certified organic or untreated seed, me-

chanical weed control, organic pest control. Similarly “conventional agriculture” is divided into a “conventional soil treatment” (e.g. mineral fertilizers, no set crop rotation) and a “conventional pest control treatment” (chemically treated seed, chemical pest and weed control).

This means that each crop is grown under 4 possible treatment combinations.

The trial will be used to evaluate phytochemical content in onion, carrot and broccoli. This would lead to a better understanding on how agronomic techniques can affect phytochemical content in field grown vegetables.

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Antioxidants in fresh-cut produce

Prof. David O’Beirne and Dr. Olive Kenny



Fruits and vegetables are rich sources of antioxidants, compounds considered protective against a range of degenerative diseases including cancer and heart disease. Ascorbic acid, carotenoids, and phenolic compounds are the main antioxidants present; levels of these vary with produce item and cultivar. For example, there are major differences in antioxidant levels among lettuce types.

Concerns have been expressed about possible losses of antioxidants in fresh-cut (i.e. prepared, packaged) fruits and vegetables as a result of processing and storage. However,

processing and storage cause complex effects. Peeling and cutting can result in an increase in general metabolism due to the mixing of previously compartmentalised enzymes and substrates, and labile compounds such as ascorbic acid can be lost. Polyphenoloxidase converts phenolic compounds to ortho-quinones, and these are converted back to phenols with the loss of ascorbic acid.

The extent of this loss is dependent on the level of tissue disruption, gas atmospheres in packages, temperature and other factors. Processing and storage can also induce stress response-type reactions which may lead to *de novo* synthesis of some antioxidant compounds. We have observed

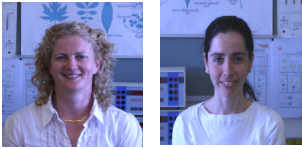
increasing levels of carotenoids and phenolic compounds during storage. Severity of processing, washing treatments, gas atmospheres and temperature were investigated, and all affected levels of individual antioxidants. However, total antioxidant levels were either unaffected or increased after processing and storage.

Choosing cultivars with high levels of antioxidants and strategically wounding (e.g. shredding) some products to induce enhanced antioxidant levels may be opportunities for greater exploitation of the antioxidant phytochemistry of fresh-cut products.

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Potential of Bramley Seedling apple peel as protection against cardiovascular diseases

Dr. Catherine Barry-Ryan and Dr. Ana Belen Martin Diana



There is strong evidence linking phytochemicals present in some fruit and vegetables with a preventive effect against cardiovascular disease (CVD). Apples such as Bramleys’s seedling apple are a well established source of these phytochemicals. However in recent times , sales in the fresh fruit sector of these traditional culinary apples – the biggest in terms of production area - have narrowed due to consumer trends towards convenience

food. In an effort to maximise the added value of this natural resource researchers at the Dublin Institute of Technology, DIT (Ms. Massini, Dr. Rico, Dr. Barry-Ryan and Dr. Martin-Diana) in collaboration with Royal College of Surgeons of Ireland, RSCI (Prof. Niamh Moran) are investigating novel methodologies to recover food grade extracts rich in pyhto-chemicals with antioxidant, antithrombotic and antihypertensive activity. Results showed that the peel flours from Bramley’s Seedling apple had higher levels of polyphenols than pomace and the presence of

core and seeds did not increase the phenolic content of the pomace, in comparison with the peels. In addition, extracts high in phenolic compounds inhibited platelet aggregation following the addition of an agonist (thrombin) in comparison to a control indicating a possible role in the prevention of CVD.

More detailed investigations with respect to the bioaccessibility and bio-availability of the compounds responsible for this anti-thrombotic activity would be necessary if their potential as a functional food ingredient is to be realised.



Apples were probably the first fruit ever cultivated by man and are very popular.

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Health Market in the Fruit & Vegetable Sector

Dr. Maeve Henchion and Ms. Bridin McIntyre



Many Irish consumers are reviewing their lifestyles

in response to worrying messages about diet and lifestyles. This may provide opportunities for fruit & vegetable growers and processors who offer fruit and vegetables with functional benefits. The Irish population has problems with obesity and associated heart-related problems - heart health issues such as cholesterol and cardiovascular disease comprise three out of the top four health concerns for Irish shoppers. A recent Bord Bia study (2007) found that if consumer are trying to eat more healthily, they will eat more fruit and vege-

tables, fish, low-fat products, high-fibre foods, etc. However other research by SLAN (2007) shows that only a small proportion of the population is consuming the recommended number of daily servings from each shelf of the food pyramid. For example, at the top of the pyramid (foods high in fats and sugar) only 14% claim to consume the recommended number (the figure for the fruit & vegetables category is 65%).

This suggests opportunities for functional foods to help consumers become healthier easily. While Irish shoppers believe strongly in foods, such as fruit and vegetables, that are naturally rich sources of vitamins and minerals, they are also willing to

eat fortified foods. Such willingness however is not shared across Europe with some northern European countries preferring food in its “pure” state.

Because perception of the healthiness of functional foods is more dependent on the nutritional qualities of the base product than on any health claim, fruit & vegetables may be an attractive base-product for functional foods. Thus, opportunities are there for the fruit & vegetables sector to capture some of the large and growing functional food market, estimated to be worth €1.4 billion in 2007.

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Broccoli, carrots and onions are the most produced and consumed vegetables in Ireland.



Innovation helps to achieve 5 a day.

Dr. Juan Valverde



Above some of more exotic varieties found in supermarkets nowadays; purple broccoli, black garlic, and black tomatoes.

It's a well accepted fact that eating at least 5 portions per day of fruit and vegetables is beneficial for health. However, the extent of the contribution of innovation in food technology to reach those five a day is not so clear. Neither the contributions that can do in the future.

The topic of the contribution of innovation to "healthy foods" has recently become a subject of interest in Spain (one's of Europe's largest producer in fruits and vegetables). In the last ten years innovation in this sector has been largely driven by advances in agronomic practices (such as new generation poly-tunnels, the use of new varieties and other new agronomic practices) and

in storage/food processing such as chilling, modified atmosphere packaging, sous-vide, high pressure processing... For example, a new generation of poly-tunnels can permit out of season production of some fruits and vegetables, increasing their volume of production, making them available fresh for longer periods and reducing costs of transport and price.

New or re-discovered eye-catching varieties have drawn consumer's attention back to the fruit and vegetable racks. Nowadays it is common to find in local markets and even in supermarkets exotics produce such as blue potatoes or garlic, black tomatoes and all sorts of colourful carrots and peppers. From a nutritional point of view some interesting agro-

nomical practices have managed to deliver vegetables rich in phytochemicals or other nutrients. In Ireland selenium enriched potatoes have made this tuber more than just a source of carbohydrates.

Investment and technological advances in packaging and storage has increased the availability of fresh fruit and vegetables to consumers. It is now commonplace to find packaged leaf or fruit salads or even fresh fruit even in relatively harsh environments such as airplanes. While consumers may not be aware it is clear that innovation continues to contribute to a healthy society and economy.

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IPFN diary of Events

This section is a list of international events on phytochemicals and food. For more detailed information please visit www.ipfn.ie/events:

Date	Events/ conferences	Location
June	19th IAMA Annual World Forum and Symposium	Budapest, Hungary
July	EUROFOODCHEM XV	Copenhagen, Denmark
July	6th European Conference on Marine Natural Products	Oporto, Portugal
September	5th International Workshop on Anthocyanins, 2009	Nagoya, Japan
September	8th Meeting of the Phytochemical Society of Europe on Bio-Pesticides	Canary Islands
November	New Challenges in Food Preservation	Budapest, Hungary
December	International Conference on Polyphenols and Health	Harrogate, UK

If you want to receive updated news and events on phytochemicals in food, join our **IPFN mailing list**. Send an e-mail to Juan Valverde at juan.valverde@teagasc.ie

In addition if you want to access to all **IPFN publications** please join the Irish Phytochemical Food Network **Industrial and Stakeholder group**. For details on membership please contact Juan Valverde at juan.valverde@teagasc.ie

