IFA / Teagasc Potato 2007

NATIONAL POTATO CONFERENCE & TRADE SHOW

2007

Contents

Welcome to IFA/TEAGASC National Potato Conference 2007

The potato industry has gone through a number of difficult years but financial returns to growers have improved somewhat in recent times. Supply and demand is one of the key driving forces of financial returns to the grower. However, these returns are being eroded year on year due to the availability of suitable land to grow high quality potatoes. Access to land will continue to be a problem especially in light of the Nitrates Directive.

The Nitrates Directive will place an added burden on growers and inevitably some will find the extra work load too much to bear. The numbers actively growing potatoes continues to decline and the remaining growers will continue to increase acreage and get more specialised.

For growers who remain growing potatoes it is becoming more important than ever to be at the cutting edge of technology and to be fully up to date with developments in the industry.

The four papers presented to you today will address some of the current issues facing the industry presently. We hope that the presentations and the trade stands will be helpful to you this year.

The IFA and Teagasc conference wish to acknowledge the assistance and support of all exhibitors and sponsors of the event.

MR. WILLIAM MONAGLE
Chairman, National Potato Committee,
IFA, Irish Farm Centre, Bluebell, Dublin 12.
Phone: 01-4500266 Fax: 01-4565146
www.ifa.ie

MR. MICHAEL HENNESSY
Tillage Specialist,
TEAGASC, Oak Park, Carlow
Phone: 059-9183427 Fax: 059-9183430
michael.hennessy@teagasc.ie
www.teagasc.ie

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Conference Programme

CONFERENCE PROGRAMME - 1.30 P.M. TO 8 P.M.

1.30 p.m.	**Registration**
SESSION I	**Chairman: Lorcan O'Toole, Acting Head of Horticulture, Teagasc, Kinsealy**
2.00 p.m.	**Welcome Address: Padraig Walshe, IFA President**
2.15 p.m.	**Official Opening: Mary Coughlan TD, Minister for Agriculture and Food**
SESSION II	**Chairman: William Monagle, Chairman, IFA National Potato Committee**
2.30 p.m.	**Insect and Nematode Pests of Potatoes in Ireland** Dr. Tom Kennedy & Dr. Finbarr Horgan - Teagasc, Oak Park, Carlow
3.00 p.m.	**Re-inventing the Potato: A Marketing Approach for the 21st Century** James Burke and Alice McGlynn - Bord Bia
SESSION III	**Chairman: Denis Griffin, Potato Breeder, Teagasc, Oak Park, Carlow**
3.45 p.m.	**Cross Compliance, the Nitrates Directive and Potato Growers** Michael Hennessy - Teagasc, Oak Park, Carlow
4.15 p.m.	**Potato Nutrition, the Art is in the Appliance of Science** Mark Ballingall - SAC (Scottish Agricultural College), Scotland
5.00 p.m.	**Close of Conference**
5.00 – 8.00 p.m.	**Trade Show**
	Tea and Coffee compliments of Bayer Crop Science
Admission	€20 (Lunch/Snacks/Bar available in hotel)

For Further Information:

Evelyn Hayes, IFA
Phone: 01-450 0266 Fax: 01-456 5146 Email: evelynhayes@ifa.ie
Michael Hennessy, Teagasc
Phone: 059 918 3427 Mobile: 087-415 8385
Email: michael.hennessy@teagasc.ie

List of Teagasc Potato Advisors

COUNTY	NAME	ADDRESS	PHONE
CARLOW/KILKENNY WATERFORD/ ST. TIPPERARY/ KILDALTON	David Lineen	Kildalton Agr. College Piltown, Co. Kilkenny	051/644552 087/2949217
	James Maloney	Kildalton Agr. College	051/644400
NTH. TIPPERARY	Liam Mullane	TEAGASC Office, Dromin Road, Nenagh, Co. Tipperary	067/31225
CORK EAST/KERRY/ LIMERICK	Andy Whelton	TEAGASC Office, Farranlea Road, Cork	021/4545055 087 7848065
CORK MID	Donal McCarthy	TEAGASC Office, Newmarket House, Newmarket, Co. Cork	029/61262
GALWAY	Denis Manning	TEAGASC Office, Hynes Buildings, St. Augustine Street, Galway	091/562101
DONEGAL	Matt Marren	TEAGASC Office, Carnamuggagh, Letterkenny, Co. Donegal	074/9121053
MEATH	Conor O'Mahoney	TEAGASC Office, Navan, Co. Meath	046/9021792 087/6087431
	Cyril Darcy	TEAGASC Office, Slane Road, Drogheda, Co. Louth	041/9833006 087/2577012
LOUTH	Conor Dobson	TEAGASC Office, Slane Road, Drogheda, Co. Louth	041/9877035 087/4173241
	Pat McGuinness	TEAGASC Office, Dublin Road, Dundalk, Co. Louth	042/9332263 087/2665418

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List of Teagasc Potato Advisors

COUNTY	NAME	ADDRESS	PHONE
DUBLIN	Shay Phelan	TEAGASC Office, Kinsealy, Malahide Rd, Dublin 17	01/8460644 087/7985195
	Stephen Alexander	TEAGASC Office, Kinsealy, Malahide Rd, Dublin 17	01/8460644 087/6273888
WEXFORD/ WICKLOW	Jim Flavin	TEAGASC Office, Johnstown Castle, Co. Wexford	053/9171360 087/2201411
	John Pettit	TEAGASC Office, Johnstown Castle, Co. Wexford	053/9171360 087/9196529
KILDARE	Ivan Whitten	TEAGASC Office, Friary Road, Naas, Co. Kildare	045/879203
	Hugh McCreevy	TEAGASC Office, Rathstewart, Athy, Co. Kildare	059/8631719

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Seed Certification Division

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Backweston, Leixlip, Co Kildare.
Tel. 01- 630 2900 Fax. 01- 628 0634

SEED CERTIFICATION DIVISION

Assistant Agricultural Inspector:
John Eivers Tel. 01- 630 2907; email john.eivers@agriculture.gov.ie
Area Superintendent:
Michael Murray Tel. 086- 812 3679; email Michael.Murray@agriculture.gov.ie

POTATO CENTRE

Tops Farm, Raphoe, Co Donegal. Tel. 074- 914 5488, 074- 914 5490; Fax. 074- 914 5262

Agricultural Inspector:
Gerry Doherty email Gerry.Doherty@agriculture.gov.ie

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Nematodes in Potato Production

PROFILE

Prepared by
Finbarr G. Horgan
Teagasc, Crops Research Department,
Oak Park Research Centre, Carlow

INTRODUCTION

Proper management of plant parasitic nematodes is essential to maintain potato yield in Ireland. Sound management begins with a full understanding of current issues in nematode pathogenicity as well as strict adherence to legislation concerned with nematode monitoring, quarantine and control. This paper introduces the main nematode species associated with potato diseases and presents some key components in their successful management.

Four groups of nematodes affect potato production in temperate climates: these are 1) the cyst nematodes, 2) root-knot nematodes, 3) stem nematodes, and 4) free-living plant pathogenic nematodes. Of these, only the potato cyst nematodes are of any importance to Irish potato producers, the remaining groups are represented by few species, of low incidence and restricted distribution and many have never been demonstrated to directly cause potato-yield loss.

POTATO CYST NEMATODES (PCN)

Two potato cyst nematodes occur in Ireland. These are the **golden cyst nematode (Y-PCN)** *(Globodera rostochiensis)* and the **pale cyst nematode (W-PCN)** *(Globodera pallida).* Y-PCN is the most prevalent species, occurring in about 98% of cyst populations. W-PCN occurs in less than 5% of populations, often mixed with Y-PCN. W-PCN has prolonged egg-hatch with a later annual activity peak than Y-PCN, it also has a slower rate of decline in all soil types (up to 30 years), and is more genetically variable that Y-PCN. As a consequence of these traits, W-PCN is more difficult to control. Widespread planting of Y-PCN resistant potato varieties appears to have caused a shift in the incidence of the two species in the Britain. There, where Y-PCN was once more prevalent, now, in many regions, W-PCN is the more prevalent species. Infrequent planting of Y-PCN resistant potatoes may be responsible for the low incidence of W-PCN in Ireland; however, there is a need to clarify the current incidence of both species here.

The first sign of PCN damage to potato crops is the poor growth, wilting and an unhealthy appearance of plants in small patches. Plants may die prematurely. Where PCN has caused wilting, an examination of the roots of the plants at about the time of flowering will indicate minute cysts. Plants respond to PCN attack by forming numerous additional rootlets giving a bushy appearance. Estimates of yield loss are variable. In general yield loss averages are about 2.5t/ha under light infestation. Very severe

Nematodes in Potato Production

infestations, of over 150 cysts per 100g of soil, will cause crop failure. Such high infestations are extremely rare under good management programs.

Management for both nematode species is based on efficient monitoring, detection and quarantine. Because PCN requires potatoes to survive, and because of the longevity of cysts in the soil, efficient crop rotation is essential to curtail population build-up, current recommendations are for a 5 to 7 year rotation between potato crops. Farmer vigilance in detection of infection foci is recommended. Potatoes demonstrating symptoms of infection should be monitored and soil examined for the presence of cysts. Because cysts are transported through soil movements, suspect ground should be avoided and farm machinery that has been through the site carefully washed for decontamination.

Seed potatoes for certification may only be grown on land that is free of PCN *(Potato Root Eelworm Order 1951).* Therefore, farmers interested in producing seed potatoes must have the land tested for the presence of PCN. This requires a formal application for PCN-testing through the Department of Agriculture and Food (DAF). Applications forms can be obtained through the local potato inspector or directly from DAF at Maynooth (Mr. Dermot Flood, Tel. 01 5053342). The local potato inspector then visits the land and collects 100 soil cores, from a 10 x 10 grid, for every hectare of land (approx. 1Kg of soil/ha). Samples are sent to TEAGASC for testing and results relayed via DAF to the farmer. Once land is certified PCN-free, the producer may apply for seed certification, again through DAF. Where a producer wishes to test for PCN, or other nematodes, for purposes other that seed certification, samples may be collected directly by the farmer and sent to one of a number of nematode laboratories that offer diagnostic services.

ROOT-KNOT NEMATODES

The **root-knot nematodes (RKN)** can become considerable potato pests; however, the principal damaging species, *Meloidogyne chitwoodi* and *Meloidogyne fallax,* have never been detected in Ireland. Other *Meloidogyne* species have recently become prevalent in Ireland, for example, only in the last few years *Meloidogyne* spp. (mainly M. minor) have become problematic in turf-grass. This may be due to recent accidental introductions of exotic nematode species into the country, or because of a sustained increase in average Winter temperatures. Effective quarantine is, therefore, important to maintain Ireland free of potato RKN, this includes restrictions and monitoring of soils and plant products through the ports and care when visiting potato farms overseas. Currently DAF conducts limited

monitoring for RKN as part of the Ring-Rot/Brown-Rot survey. Tubers are sent to TEAGASC where they are examined for dark brown spots symptomatic of RNK.

POTATO ROT NEMATODES

The **potato rot nematode (PRN),** *Ditylenchus destructor,* has a worldwide distribution; however, it is not prevalent in Ireland and was last detected here in the 1970s. The nematode prefers cool, moist soils and may overwinter during any life stage. The nematodes enter potato tubers through the lenticels, multiplying rapidly to invade the whole tuber. They can continue to live and develop within harvested tubers. There are no visible symptoms during the plant growth period although heavily infested tubers may give rise to weak and wilted plants. Lesions appear on the tuber as small brown blemishes, the underlying tissues appearing granular and spongy. Badly affected tubers will have sunken areas with cracked and wrinkled skin with greyish to black flesh where secondary infections due to fungi and bacteria occur. The presence of PRN in potato growing areas precludes potato export due to the restrictions imposed by many countries against the pest.

FREE-LIVING PLANT PATHOGENIC NEMATODES

Recently there has been a lot of concern about the possibility that **free-living plant parasitic nematodes (FLN)** may be associated with certain potato diseases, including **Spraing** and **Internal Rust Spot (IRS).** Whereas there is no clear evidence of FLN causing IRS, some species are involved in viral transmission that may lead to certain types of spraing.

The free-living nematodes include a heterogeneous group of plant pathogens that occur in all soils and may feed from a wide variety of plants. The main species include stubby-root nematodes (SRN) (Trichodorus spp. and Paratrichodorus spp.) and needle nematodes (Longidorus spp.). Feeding by SRN on root tips causes elongation of roots to cease, and results in stubby-root symptoms. The damaged roots are less capable of supplying the plant with adequate water and nutrients from soil. SRN live in coarser, sandy soils, and are one of the few nematodes capable of transmitting plant viruses. Trichodorus spp. are vectors of Tobacco Rattle Virus (TRV), which is one of the causes of spraing in potatoes (Potato Mop Top Virus, A soil-borne virus, transmitted by the potato powdery scab fungus Spongospora subterranea is another cause). Once TRV enters the tuber, following nematode feeding, the potato responds by sealing-off the infected area, this may produce brown necrotic spots. Spraing symptoms occur only in the tuber flesh with no visible signs of infection on the external skin. Infected plants do not show foliar symptoms in the year of infection but infected tubers may produce plants showing secondary symptoms in the form of a mottling on some leaves and stems.

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Spraing can be managed using spraing-resistant potato varieties, rotavation of soil and by controlling weeds that may act as alternate plant hosts for the nematodes.
Needle nematodes occur in some sandy soils and are important virus vectors in strawberry production. There is no evidence that these species cause any reduction in potato yield. There appears to be a generally low incidence of SRN and needle nematodes in Irish potato fields, possibly due to unsuitable clayey soil conditions.

Effective nematode management
Potato growers should be aware that, other than for PCN, yield reduction due to plant pathogenic nematodes is low. Yield maintenance and improvement will largely depend on efficient management of pathogenic nematodes. Currently in Ireland, Mocap (Ethoprophos) is the only registered product with nematicidal properties; Mocap is approved for wireworm control but may soon be withdrawn. Vydate (Oxamyl) is not registered for use in Ireland and is currently under European review. Temik and Nemathorin have already been withdrawn from use in Europe. The use of nematicides needs to be considered carefully, given the lack of any direct evidence linking certain nematodes (i.e., some FLN) to yield/quality reductions and the general low incidence (FLN, PRN) or absence (RKN) in Ireland of some important potato pathogens.

Furthermore, all pesticides are toxic and carry environmental and health concerns. Therefore, the best strategy for maintaining high potato yield will include adherence to monitoring and certification programs set out by DAF, crop rotation, weed management and rotavation, as well as careful avoidance of contamination through proper hygienic practices associated with transportation and soil movement.

Aphid and Wireworms Problems in Potatoes

PROFILE

Prepared by
Tom Kennedy,
Teagasc,
Oak Park Research Centre,
Carlow

SUMMARY

Up to fifty species of aphids have been found in potato fields in Ireland. Among those species is the peach-potato aphid *(Myzus persicae)* which is an efficient transmitter of virus disease. However, the latter species is neither widely distributed nor numerically dominant in Ireland. The highest concentrations of this aphid were found in counties Louth, Meath and Wicklow. Investigations confirmed insecticide resistance in *Myzus persicae* captured in NE Leinster in 2005. Any of the presently available insecticides will control aphids other than *Myzus persicae*. The latter species can be controlled with pymetrozine (Plenum) and thiacloprid (Biscaya).

Wireworm damage to potatoes is best avoided by planting in land at least four seasons from lea. Soil sampling can provide an indication of possible wireworm damage. Ethoprophos (Mocap) can give significant control of wireworm damage to tubers but will not give complete control where high infestations occur.

INTRODUCTION

Aphids are the most serious foliage pests of potatoes occurring in Ireland. However, aphid damage in potato crops is sporadic. Aphids cause crop damage by transmitting virus diseases and by feeding on plants. With the exception of Potato leaf-roll virus (PLRV), all aphid-borne potato viruses are non-persistently transmitted. Persistent viruses are those that having being acquired by the aphid can be transmitted for the lifetime of the aphid while non-persistent (stylet borne) viruses are only transmissible for a period of hours following acquisition. These include: potato virus Y (PVY), PVA, and some strains of PVS. In the absence of virus infection, the yield reduction due to aphid feeding depends on timing, duration, extent and species composition of aphid infestation. The spread of non-persistent viruses is unlikely to be controlled by aphicides since transmission would occur before the pesticide could kill the aphid. However, the regulations governing seed certification ensure viruses are not a major problem in crops. Resistance to aphicides in the aphid *M. persicae* to organophosphate and carbamate type insecticides was first reported in 1971 (1). This resistance which is due to high levels of an esterase enzyme (E4) sequesters and inactivates the insecticide. More recently two other forms, MACE and kdr-resistance, were reported in 1990 and 1997, respectively (2, 3). MACE confers resistance to the insecticides pirimicarb and triazamate while kdr provides resistance to pyrethroids.

Wireworm damage potatoes by burrowing small holes in tubers. This

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damage has little effect on yield but affects quality and is unacceptable to consumers. This article briefly comments on aphid occurrence in potatoes, the detection of aphicide resistance in *Myzus persicae* (peach-potato aphid) in the NE Leinster area and on the appropriate use of aphicides. The problem of wireworm damage to potatoes is also discussed.

APHIDS ON POTATO CROPS

Winged aphids were captured in yellow-water-traps (YWT) at 10-15 locations throughout Ireland in the period 1991-1994. A total of 49 species of winged aphids were identified including the five species commonly associated with virus spread in potato crops in NW Europe (4). The species are; *Macrosiphum euphorbiae* (potato aphid), *Myzus persicae* (peach-potato aphid), *Brachycaudus helichrysi* (leaf-curling plum aphid), *Aphis fabae* (black bean aphid) and *Acyrthosiphon pisum* (pea aphid). The most efficient transmitter of virus is *M. persicae*, however, this species is not very common in Ireland. In the two seasons for which complete data is available *M. persicae* only comprised 0.3% and 4%, respectively, of the winged aphids captured in traps. While species such as *B. helichrysi* are only 1-2% as efficient as *M. persicae* in the transmission of virus disease their overall effect can be much greater since they are far more abundant in potato crops. *Myzus persicae* is presently the only species having resistance to aphicides. This species was more numerous in traps from the NE Leinster area than those from the remaining parts of the country. The percent *Myzus persicae* in traps from counties Louth, Meath and Wicklow was 9.8%, 7.1% and 5.4%, respectively. In 2005 aphids of this species collected from potato crops in Counties Dublin, Meath and Louth were examined for resistance to aphicides. While only a relatively small number of *M. persicae* were obtained from crops resistance to insecticides was found.

APHID CONTROL

Commercial crops

- Crops should only be sprayed when aphids are present and conditions favourable for multiplication exist.
- In most seasons a single aphicide could be sufficient – in fact no aphicide application would be required in some seasons.
- A large aphid infestation in August can cause considerable yield loss. If aphid numbers exceed 5 per leaf an aphicide may be necessary. The top, lower and middle leaves of plants should be examined over the entire crop.
- Do not repeat applications of any insecticide that appears not to work when applied at full-rate.
- If aphids other than *M. persicae* are present any of the organophosphate, carbamate or pyrethroid aphicides can be used. If the aphid infestation includes *M. persicae* then pymetrozine (Plenum) or the new insecticide thiacloprid (Biscaya) should be used.

Aphid and Wireworms Problems in Potatoes

- In the case of thiacloprid only a single application is permitted per ware-crop.

SEED CROPS

- If aphids other than *M. persicae* are present any of the organophosphate, carbamate or pyrethroid aphicides can be used.
- If *M. persicae* and other aphids occur an aphicide should be applied as soon as 10% of plants have emerged. The initial aphicide should be pymetrozine (Plenum) applied at label recommended rates. Thiacloprid (Biscaya) can also be used; only two applications of this product should be applied per seed crop.
- After 10 days a second aphicide application should be made. This spray could be the carbamate pirimicarb (Aphox).
- Third and subsequent sprays could alternate between pymetrozine and pirimicarb until "crop burn off".
- Spray intervals should be 10-14 days.
- There should be an interval of at least 7 days between the last application of pymetrozine and harvest.

WIREWORMS

Wireworm damage in potatoes has traditionally been associated with the planting of crops in fields recently ploughed from lea. Populations of wireworms decrease relatively quickly under arable cultivation and it is unusual for large numbers to persist more than three to four years after ploughing. However, over the past number of seasons wireworm damage to potatoes has been reported in fields several seasons from lea. Since the only means of controlling wireworms in potatoes is by applying insecticides at or prior to planting it is necessary to establish if these pests are present before planting the crop. Various methods of determining the presence and extent of wireworm populations in fields selected for the growing of potatoes have been devised including soil-sampling and bait trapping for larvae (worms) and 'plastic-sheet' traps and pheromone-traps for adults (beetles). For soil sampling and traps to provide any useful indication of wireworm occurrence it is necessary to commence monitoring in the season prior to planting. Of the various methods employed to predict the presence of wireworms soil sampling is as effective as other methods even if somewhat labour intensive. Standard recommendations for soil sampling are: take 20 samples with a sampling corer of 10 cm diameter to a depth of 10-15 cm at random locations in fields of 4-10 hectares in size. The finding of a single wireworm per 20 samples would represent 63,635 larvae per hectare which is approximately the threshold at which control measures should be adopted. It should be noted, however, that the failure to find any larvae in the 20 samples does not indicate that wireworms are not present since at this sampling intensity there could be as many as 60,000 larvae per hectare without being

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detected in this number of samples. Furthermore, a population of this magnitude could cause an unacceptable level of damage.

CONTROL

Aldrin was the most effective insecticide in controlling wireworms but its use is no longer permitted. However, this product never gave complete control and in Oak Park trials having large wireworm infestations the percent tubers having wireworm damage in aldrin treated plots ranged from 30% to 45%. Ethoprophos (Mocap) is the best product currently available for wireworm control. While ethoprophos can give significant control of wireworm damage it will not provide complete control and substantial damage can still ensue where high populations of wireworms are present in treated soils. The results of wireworm control trials involving ethoprophos in the UK have shown this product to give good control at some sites while its performance over a number of sites was inconsistent (5). Other investigations (6) indicate ethoprophos gave comparable levels of control of wireworm damage to that for aldrin.

RECOMMENDATIONS

- Wireworm damage can only be avoided by growing potatoes in fields free from infestation.
- Sow potatoes in fields that have grown arable crops for a few seasons. Fields 3-4 years from grass should not have a high infestation of larvae.
- Avoid long-time set-a-side and weedy fields.
- Undertake soil sampling in the season prior to planting potatoes and preferably do so in the preceding spring and again in autumn.
- Where sampling indicates an infestation of more than 70,000 larvae per hectare insecticidal treatment should be applied.
- Where low infestations occur it may be beneficial to delay ploughing until close to planting as wireworms may continue to feed on the inverted sod and thus refrain from damaging tubers.
- If potatoes are to be grown plant a variety that can be harvested early (end of August if possible).
- Ethoprophos (Mocap) is the most effective insecticide in controlling wireworms but even this product will not provide effective control where high populations of larvae occur.

ACKNOWLEDGEMENTS

I wish to thank Dr. Steve Foster, Rothamsted Research for aphicide-resistance testing of aphids. I also thank Shay Phelan, Conor Dobson and Cyril Darcy Teagasc Tillage Advisers, Dublin, Louth and Meath, respectively, for collecting aphid samples.

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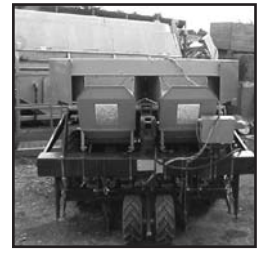

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Re-inventing the Potato
A Marketing Approach for the 21st Century

PROFILE

Prepared by
Alice McGlynn,
Bord Bia, Irish Food Board

INTRODUCTION

In 2005 consumers spent €162 million on potatoes – an increase of 8% on 2004 figures (TNS, 2006). Consumption of no other vegetable comes close by comparison, the nearest being tomato coming in at €74 million, followed by carrots at €49 million. Penetration of potatoes into Irish households is at 95% which substantiates both the accolade that for all intents and purposes the Potato is Ireland's favourite vegetable and the fact that it is our staple food. In reality the potato category has declined by 12% in volume terms between 2001 and 2005. Customer usage of the category is falling, driven by competition from other categories and an overall perception that the category is dated, inconvenient and lacking the modern appeal of some of the other side of plate options.

In order to get a handle on consumer behaviour it is necessary to understand the macro-environment of the marketplace. This study will consider the main macro-environmental influences (political/legal, economic, social, technological, and environmental) affecting the food industry, specifically potatoes and those which have an impact on marketing decisions of the potato category now and into the future.

MACRO-ENVIRONMENT

To set the scene we will look at the social, political and legal developments in Ireland over recent times. The Irish economic boom has been unprecedented over the past decade. Economic growth, which has increased by 5.8 per cent volume change during 2006, is the strongest in Europe. As a consequence of the increase in disposable income Irish consumption is growing at a rate of 6.8 per cent feeding further the insatiable appetite of the Celtic beast. There has been a natural population increase of 131,000 and a net immigration figure of 186,000 during this period (Census, 2006).

The impact of the economic boom has had both positive and negative ramifications for Irish society and lifestyle.

BACKGROUND THEMES

There are six main consumer lifestyle trends which currently affect the food market (Henley, 2006.)

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A Marketing Approach for the 21st Century

LIVING LIFE TO THE FULL

Rising affluence, growing knowledge of global opportunities, changing working patterns and demographic shifts are the driving forces behind this trend where consumers are seeking an antidote to the pressures of modern life. Modern, interesting and exciting potato recipes endorsed and promoted by media chefs and/or retailers could place the potato back in the lime light for this group. New varieties of potatoes such as 'fingerlings and 'Purples' can add a new dimension to a dinner plate and can often become the focus of discussion at dinner parties. The customer segmentation most likely to be most involved with this trend would be the Accelerating Employees, Empty Nesters, and to a lesser extent Young Initiates (see Table 1. below for customer segment descriptions).

LIFE ON THE GO

Changing working patterns, rising urbanisation, increasing mobility and rise of new media and communication technologies are creating a consumer base that is short of time and anxious to make every minute matter. Most families now have both working parents. Time pressure has increased the demand for more convenient type foods and has lead to the situation where many meals are eaten out of home or 'on the go'. This drive for convenience appears to be favouring the competitive carbohydrate substitutes namely, rice and pasta over potatoes.

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A Marketing Approach for the 21st Century

Products that are more convenient, require less preparation time, are 'within arm's reach' and require little energy expenditure will win the day. Fresh potato solutions might include; microwavable packs, ready peeled vacuum packed bags, 'peel and pour baby potatoes' ready prepared mash etc. Products that enhance personal energy such as healthy option potato snacks are in high demand. With increasing time pressures there is a necessity to find quicker communication methods, for instance through easily recognisable symbols and visuals such as cooking icons on potato packaging rather than written instructions. The customer segments most likely to follow this trend are the Young Initiates, Accelerating Employees, and Pressurised Families (See Table 1).

TABLE 1. CUSTOMER SEGMENT BASED ON POTATO PURCHASING BEHAVIOUR AND LIFESTAGE.

Customer Segment	Demographics
Independent Students	19-23 year olds. Often working part-time Often living with 2-3 others.
Young Initiates	23-27 working full-time Co-habiting with friends
Accelerating Employees	Co-habiting/married Commuting: time pressured. Pressure of Mortgage
Pressurised Families	Both parents work Commuting time impacting on family life.
Young Regional Families	33+ Working in home or part-time Mix younger children Close knit community
Empty Nesters	1 to 2 person households Increasing in number Mainly more disposable income

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MAKING A DIFFERENCE

As our society becomes more affluent and educated there are many consumers wishing to take a stand for their personal principles and beliefs. Consumers are becoming more aware of the effect of increased globalisation, the threats of global warming, the damage to the environment resulting from the impact of unsustainable practices in industry and agriculture and as a result are demanding products which have a conscious and which provide the purchaser with a sense of 'doing what is right'.

Campaigns that promote the benefits of organic and fertilizer free options, biodegradable or no packaging (loose potatoes), support of 'fare-trade' for local potato growers who are under continuous pressure to reduce margins below reasonable levels, will target this group and are excellent marketing opportunities.

QUEST FOR HEALTH AND WELLBEING

There is a growing public and media focus on health and physical image which is being fuelled by changing lifestyles and demographics. Allergies, intolerances and obesity are on the increase. Consumers are on a mission to regain control over their own health. Most people do not know that potatoes are an excellent source of fibre, essential minerals and vitamins. Potatoes with skins can provide more potassium than bananas or broccoli. They have virtually 0% fat, lower than both pasta and rice and a portion provides less than 10% of daily intake of carbohydrates. 29% of consumers are eating less because they consider them 'fattening' or 'too fattening' (Research Solutions 2006).

SMART SHOPPERS

Consumers want to know that they received value for their money. Although it includes price as an element, the 'value' proposition is a wider concept that includes the 'experience'. Potatoes are universally the value option. Heretofore there has been little product segmentation of the potato category apart from bagged or loose. Most promotions have concentrated on 'price' rather than the wider 'value' concept. In addition, the commoditisation of the category is reducing the impact of potential differentiators such as potato varieties including Rooster, Kerrs Pinks, Golden Wonder etc.

Research from the United States has shown that the Potato category is best divided into the following segments based on the offering to consumers (NPPB 2006):

- Bargain
- Mainstream
- Premium
- Specialty

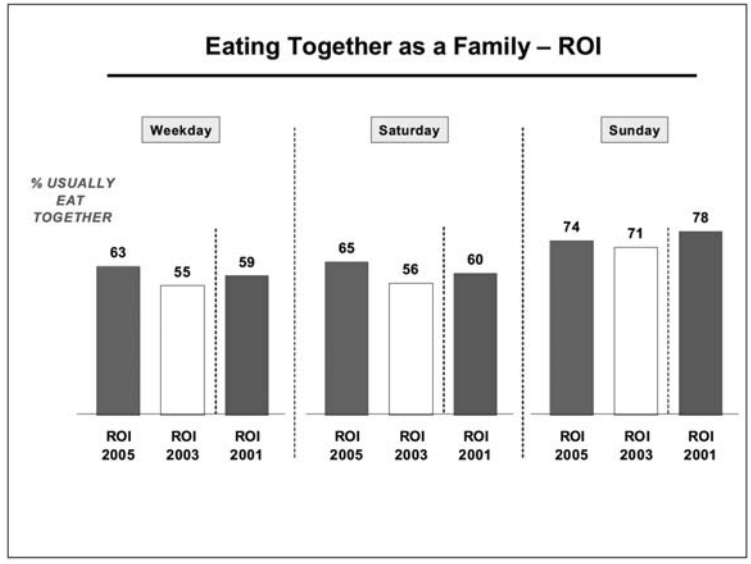
Segmentation helps target the category toward different types of consumers with different potato needs and becomes the basis of all key category decisions such as assortment,

pricing guidelines, merchandising location/combinations and promotions.

THE REAL THING

As a backlash against the modern consumerism there is a growing trend to go 'back to basics'. Consumers are demanding transparency with regard to how products are made and what goes into them. Locally produced and provenance are for some consumers key drivers of buying behaviour. 1 in 2 ROI adults rate buying local produce as fairly/very important compared with just 4 in 10 NI adults and 1 in 3 British adults of the same opinion (PERIscope 3). In this regards potatoes are the perfect product.

There is a counter trend termed 'homing' beginning to emerge. Most typically spoken of in the context of the US post 9/11, 'homing' is the trend of the home and family regaining importance in society. We are beginning to see indications of a backlash to the materialism and individualistic culture of the 80s and 90s, Europeans are returning to what matters: the home and family environment. The chart below shows the changes in percentage of families that are eating together between 2001 and 2003 (Periscope, 2005).



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PERCEPTIONS AND POSITIONING

Further research conducted on behalf of Bord Bia shows that there are three main perceptions in relation to characterising potatoes.

Traditional

Presently older families, Empty Nesters and the Retired see the potato as the backbone of the meal solution. This group eat potato on average three times per week with their evening meal (TNS, 2006). As mentioned before the 'homing' trend is increasing the incidence of these meal occasions beyond that of the rural family and is affecting the younger, urban families as well.

Apathetists

Independent Students and Young Initiates see potatoes as a transitional point where they have a temporary foothold and where the value proposition is extremely important overcoming any preparation barriers. Value options within the product segments, including the Premium and Specialty segments, would encourage greater buy-in from this group and help secure them as future potato purchasers.

Modernist

For Accelerating Employees and some of the more affluent Young Initiates the present offering of potatoes is perceived as more relevant for a by gone era. They are stable, simple but bland and boring. The competitive alternative is far more appealing and is anchored with other products that are more versatile, convenient and compelling. Appealing to the health conscious of this group could overcome their reluctance to buy potatoes over other competitor products.

The diagram below show the perceptions of potatoes, rice and pasta compared with the facts: (Research Solutions, 2006).

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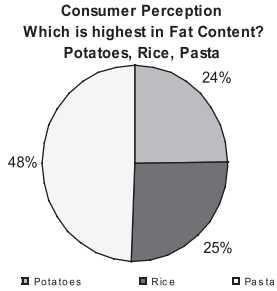
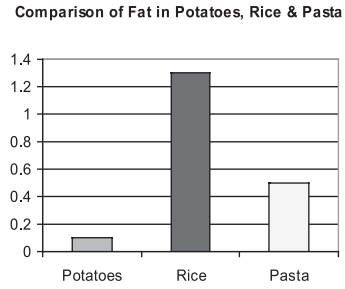
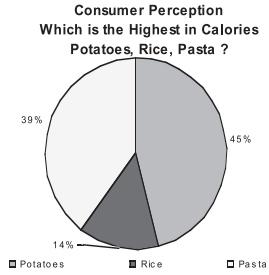
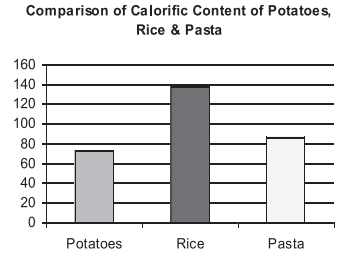
PERCEPTION	FACT









CONCLUSIONS

There can be no doubt that potato consumption since the turn of the century has been in decline. Socio-economic, consumer and market trends appear to be indicating that the potato lacks something in terms of providing solutions to the needs of the consumer when compared with its competitors.

Inspiration in the guise of new and exciting recipes, assistance in cooking potato varieties, and the health benefits associated with eating the potato comprise the information needed by the consumer. New, exciting, and smaller packaging is required. Product innovation is required to address the gaps in the market for convenience and ease of preparation. New avenues of purchase and sale such as farmers markets and 'box schemes' need to be explored and expanded in relation to local and organic produce and putting

the power back into the hands of the grower in order to guarantee the future of the domestic production. Retailers need to come up with new and novel ways of displaying and merchandising the product in order to move away from the commodity management approach. Pricing needs to be related to the product segment, whether bargain, mainstream, premium or specialty and promotion should incorporate all aspect of the 'value' of the potato rather than constantly focussing on price.
It is in the power of the industry to reverse any decline taking place and even improve consumption going into the future. The information is available it is just a matter of using it.

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REPORT 4

Cross Compliance, the Nitrates Directive and the Potato Grower.

PROFILE

By Michael Hennessy,
Tillage Specialist, Teagasc,
Oak Park, Carlow

INTRODUCTION

New rules, signed into law, contained in the Nitrates Directive regulations (SI 378) during the past year are having an impact on farming practice on the ground. These rules are laws of the land rather than rules connected to the payment of the Single Farm Payment and all land owners have to abide by the rules even they are not participating in the Single Payment Scheme.

Rules directly connected to the Single Payment Scheme, such as the Statutory Management Requirements (SMRs) set down in EU legislation on the environment; public, animal and plant health; and animal welfare must also be adhered to by potato growers. Growers must also maintain land in Good Agricultural and Environmental Condition (GAEC). These combined regulations are known as Cross-Compliance.

Cross Compliance rules are largely monitored through inspection of records on the farm. Potato growers are no strangers to keeping records of all the activities of the potato crop as part of Bord Bia Quality Schemes or other quality schemes relating to brands or distributors and as such the Cross Compliance requirements are largely being met by growers.

This paper will try to cover some of the issues relating to the Nitrates Directive and Cross Compliance rules which will affect potato growers.

NITRATES DIRECTIVE

In order to comply with the Nitrates Directive a grower must be aware of the many issues which the directives effects. Nutrient management in the field is the main area most growers associate with the directive. The directive strives to ensure that the crops requirements for nutrients are satisfied. The fertiliser levels in the directive are maximum permitted levels and not recommended rates for a given set of circumstances.

In order to arrive at a correct value of fertiliser for the current cropping year areas such as previous crop history, a soil sample of phosphate and the application of organic manures to the field all need to be considered.

Effective nutrient management is a common sense and economic approach to farming. The vast majority of farmers have been using nutrient management techniques successfully for years; however, previous fertiliser guidelines are now legal maxima.

ORGANIC NITROGEN – 'THE 170 KG/HA LIMIT'

Organic nitrogen is determined by the stocking rate of animals on a farm and quantities of organic manures imported onto a farm. The maximum permitted limit is 170 kg organic N/ha. On livestock farms it is effectively a stocking rate limit. It is not a limit on chemical N fertiliser. Tillage farmers importing organic manures are limited to 170 kg organic N/ha. For example

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you are limited to spreading 15.5 t/ha of broiler litter per year. Derogations to exceed the 170Kg/ha limit of organic nitrogen are, at time of press, still being drawn up but it is likely that mainly tillage growers will not benefit from this derogation.

SOIL PHOSPHORUS INDEX

The phosphorus (P) advice for tillage crops is shown in appendix 1. No chemical fertiliser P is permitted to tillage crops at soil P index 4 unless potatoes are being grown. Soil analysis is the basis to determine the crops P requirement. In the absence of a soil test taken in the last 5 years, soil P is assumed to be at soil P index 3.

Potash (K) is not included under SI 378 but should be part of any nutrient plan.

SOIL NITROGEN INDEX

The soil nitrogen (N) index system indicates the soils ability to supply N during the growing season and depends on the previous cropping history and previous organic manure applications. There are four N indices ranging from 1 to 4 - index 1 soils containing small soil nitrogen reserves and index 4 soils having the largest soil nitrogen reserves. Within SI 378 the nitrogen index table is split into two (see appendix 4). The upper half of the table applies to tillage crops grown in land more than 5 years 'away' from long term grass leys and is the most common situation found on farms. The lower half of the table applies to tillage crops grown in land less than 5 years 'away' from long term grass leys. In appendix 4, the crop within the columns is the previous crop. For example, in the case of land being in tillage more than 5 years, where potatoes were the previous crop, the soil (and crop to be fertilised) is classed as being in N index 2.

The categorisation of nitrogen for potato crops is based on the crop type rather than the categorisation of a variety according to haulm duration. Crops are fertilised according to nitrogen index and general type. For example, a main crop of potatoes in index 1 can receive a maximum of 170 kg N per hectare. This can be made up of either chemical nitrogen or organic manure or a combination.

PREVIOUS CEREAL CROP YIELDS

Additional nitrogen is allowable under SI 378 for high yielding cereal crops and does not include potato crops. The higher yield is based on the best yield in any one of the three previous harvests at 20% moisture content. For every 1 tonne/ha above reference yields (see appendix 6), a farmer may apply an extra 20 kg N/ha. Records (weighbridge dockets, etc) should be used to support farm reference yields.

ORGANIC MANURES

The nutrient value (N & P) of all organic manures is specified in appendix 5. The phosphorus contained in organic manures is deemed to be 100% available to the growing crop. The nitrogen in organic manures has varying rates of availability, increasing up to 2010 in order to encourage better and novel use of manures. If land has received dressings of organic

Cross Compliance, the Nitrates Directive and the Potato Grower.

manure in two successive years, it is deemed to be soil N index 2. Transitional provisions allow that imported pig, poultry and spent mushroom compost can be applied to P index 4 soils up until 2011. However, the 170 kg organic N/ha limit still applies and all the imported phosphorous is assessed on a whole farm basis.
This may have implications for potatoes grown under the "no chemical fertiliser" banner. Potatoes grown under this regime may struggle for total nitrogen however it must be remembered nitrates and phosphate limits are assessed on a whole farm basis.

PREVENTION OF WATER POLLUTION FROM FERTILISERS AND CERTAIN ACTIVITIES

All growers are subject to farming under the Code of Good Agricultural Practice for many years now. Additional conditions in the Cross Compliance rules in areas such as green cover on stubbles, ploughing and destroying growing vegetation in the winter time and the maintenance of the soil in good condition are all apart of the new regulations. The prevention of direct application or filtering of nitrogen to water courses is at the heart of these measures. The application of nitrogen and phosphorus in both the chemical and organic form is limited to specific spreading periods and zones, see appendix 1 and 2.

USE OF PESTICIDES

Only use and keep in store, pesticides that are authorized by the Pesticide Control Service (PCS). The full list is published each year by the PCS and available from their website www.pcs.gov.ie . Pesticides should be used and handled in accordance with current labels.

RECORDS OF PESTICIDES

Keep a record of pesticide application date, rate and quantity. Many quality assurance schemes, including the Bord Bia Quality Assurance Scheme, requires all growers to maintain detailed records of chemical usage and these records will be acceptable for an inspection. The Irish Grain Assurance Scheme (IGAS) record book and the Teagasc E-CRoPs program are also acceptable for this purpose. Keep a record of the PCS registration number of any pesticides used.

PESTICIDE STORE

Ensure the pesticide store is leak-proof and has a bucket of sand available to soak small spillages. Keep pesticides in a signed, secure shed/press etc. Dispose of empty pesticide cans to an authorized body – keeping the disposal receipt.

CONCLUSIONS

The Cross Compliance Rules applies to all farm land in Ireland and as such every grower.
The application of the rules within the farm will present a serious challenge to all growers. The maintenance of records as part of these rules may not impose undue extra burden on potato growers especially those who are already part of a Quality Assurance scheme. However, at the beginning of the year, all growers should estimate the total volumes of manures which they can use on the farm

Cross Compliance, the Nitrates Directive and the Potato Grower.

through the year. This will ensure growers do not apply excess nutrients over the farm.
The total nutrients available to potato grower's crops will enable profitable crops to be grown in the future. All growers should manage the available nutrients in the context of the whole farm basis. Use of the nutrients on specific crops should be monitored carefully to obtain the best economic return from the available nutrients. Widespread changes in the practice of growing potatoes are not needed in order for growers to farm profitably under the Nitrates Directive.

Appendix 1: Country Zones
Zone:
A Carlow, Cork, Dublin, Kildare, Kilkenny, Laois, Offaly, Tipperary, Waterford, Wexford, Wicklow.
B Clare, Galway, Kerry, Limerick, Longford, Louth, Mayo, Meath, Roscommon, Sligo, Westmeath.
C Cavan, Donegal, Leitrim, Monaghan.

APPENDIX 2: NON-APPLICATION PERIODS OF FERTILISERS TO LAND

Fertiliser Type	Start date		End date			
		Zone	A	B	C	
Chemical	15th Sept.	to	12	15	31	Jan.
Organic (not FYM)	15th Oct.	to	12	15	31	Jan.
FYM	1st Nov.	to	12	15	31	Jan.

APPENDIX 3: MAXIMUM FERTILIZATION RATES OF PHOSPHORUS ON TILLAGE CROPS (TAKEN FROM SI 378 SHORTENED VERSION)

Crop	Phosphorus Index 1	2	3	4
	Available Phosphorus (kg/ha)[1]			
Cereals (Winter and Spring)	45	35	25	0
Potatoes: Main crop	125	100	75	50
Potatoes: Early	125	115	100	50
Potatoes: Seed	125	115	100	85
Maize	70	50	40	0
Field Beans	50	40	20	0
Oil Seed Rape	35	30	20	0
Forage Rape	40	30	20	0

1 The fertilization rates for soils which have more than 20% organic matter shall not exceed the amounts permitted for Index 3 soils.

Cross Compliance, the Nitrates Directive and the Potato Grower.

APPENDIX 4: DETERMINING NITROGEN INDEX FOR TILLAGE CROPS (TAKEN FROM SI 378)

Continuous tillage: - crops that follow short leys (1-4 years) or tillage crops Nitrogen Index			
Index 1	**Index 2**	**Index 3**	**Index 4**
Cereals Maize Vegetables receiving less than 200 kg/ha nitrogen	Sugar beet, Fodder beet, Potatoes, Mangels, Kale, Oil Seed Rape, Peas, Beans Leys (1-4 years) grazed or cut and grazed. Swedes removed Any crop receiving dressings of organic fertiliser Vegetables receiving more than 200 kg/ha nitrogen	Swedes grazed in situ	

TILLAGE CROPS THAT FOLLOW PERMANENT PASTURE			
Index 1	**Index 2**	**Index 3**	**Index 4**
Any crop sown as the 5th or subsequent tillage crop following permanent pasture	Any crop sown as the 3rd or 4th tillage crop following permanent pasture. If original permanent pasture was cut only, use index 1	Any crop sown as the 1st or 2nd tillage crop following permanent pasture (see also Index 4). If original permanent pasture was cut only, use index 2	Any crop sown as the 1st or 2nd tillage crop following very good permanent pasture which was grazed only

APPENDIX 5: AMOUNT OF NUTRIENTS CONTAINED IN 1 TONNE OF ORGANIC FERTILISERS OTHER THAN SLURRY (TAKEN FROM SI 378)

	Livestock type	Total Nitrogen (kg)	Total Phosphorus (kg)
Poultry manure	broilers/deep litter	11.0	6.0
	layers 55% dry matter	23.0	5.5
	Turkeys	28.0	13.8
Dungstead manure (cattle)		3.5	0.9
Farmyard manure		4.5	1.2
Spent mushroom compost		8.0	2.5
Sewage sludge		Total nitrogen & total phosphorus content per tonne shall be as declared by the supplier in accordance with the Waste Management (Use of Sewage Sludge in Agriculture) Regulations, 1998 to 2001 and any subsequent amendments thereto.	
Dairy processing residues and other products not listed above		Total nitrogen & total phosphorus content per tonne based on certified analysis shall be provided by the supplier	

APPENDIX 6: MAXIMUM FERTILIZATION RATES OF NITROGEN ON TILLAGE CROPS (TAKEN FROM SI 378, SHORTENED VERSION)

Crop	Nitrogen Index			
	1	2	3	4
	Available Nitrogen (kg/ha)			
Winter Wheat1	190	140	100	60
Spring Wheat1, 2	140	110	75	40
Winter Barley1	160	135	100	60
Spring Barley1	135	100	75	40
Winter Oats1	145	120	85	45
Spring Oats1	110	90	60	30
Fodder Beet	195	155	120	80
Potatoes: Main crop	170	145	120	95
Potatoes: Early	155	130	105	80
Potatoes: Seed	155	130	105	80
Oilseed Rape	225	180	160	140

[1] Where proof of higher yields is available, an additional 20kg N/ha may be applied for each additional tonne above the following yields;
Winter Wheat - 9.0 tonnes/ha Spring Wheat - 7.5 tonnes/ha
Winter Barley - 8.5 tonnes/ha Spring Barley - 7.5 tonnes/ha
Winter Oats – 7.5 tonnes/ha Spring Oats – 6.5 tonnes/ha
The higher yields shall be based on the best yield achieved in any of the three previous harvests, at 20% moisture content.

[2] Where milling wheat is grown under a contract to a purchaser of milling wheat an extra 30 kg N/ha may be applied.

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REPORT 5

Potato Nutrition, The Art is in the Appliance of Science

PROFILE

Prepared by
Mark Ballingall, SAC

The first step in potato nutrition is a basic soil analysis covering the macro nutrients, Phosphate, Potassium and Magnesium not to mention pH. This is even more important on rented land where the soil history may be unknown. The cost of a routine analysis is insignificant compared to the cost of fertiliser. The grower is often faced with "good buys" of , for example 14:14:21, which may be an inappropriate ratios that over applies either phosphate or potash. It may be more important to use straights. There may be a need to use Calcium Nitrate as part of the basal dressing if Internal Rust Spot is a risk (better than a foliar calcium application). The best time to apply calcium nitrate is at tuber initiation, so it will affect initial level of the basal dressing. Over applying potash, a distinct problem where FYM is applied, can lock up Magnesium. (Magnesium is an important constituent of Chlorophyll). Magnesium deficiency can be effectively and cheaply applied to the potato crop as Bittersalz, (magnesium sulphate) in season. Magnesium sulphate is also a good source of available sulphur. Equally, high magnesium levels can impact on potash availability therefore allowances need to be made within the basal potash rate. There is some data to suggest that applying more potash than crop requirement will reduce bruising, (ADAS Terrington 2001). Equally in a survey (BPC Bruce Report 2004) it was found that in Piper and Cara while increased tuber potash and magnesium levels was correlated with reduced bruising the relationship was not dependent in soil applications. Excessive phosphate can impact on manganese and zinc availability. But more importantly it is likely that phosphate will soon come under the same spotlight as nitrogen. Where potatoes are rotated around the farm it may be useful to use the GPS system of soil analysis. This is useful if the farm is an amalgamation of smaller units where the cropping and soil types may vary. Variable application of lime, phosphate and potash using straights are possible depending on the variability. Although crops are usually limed after the potato crop pH can also affect the availability of nutrients. Calcium magnesium, phosphate and potash all become less available as the pH drops below pH 5.6.

It is also useful to know the soil status of micro nutrients, e.g. manganese, calcium, zinc, boron and sulphur. With sulphur deposition from the atmosphere now low it is a mute point whether it should be classed as a macro nutrient. Where there is a history of using magnesium limestone, then calcium levels may be low. Calcium and boron are linked. Low levels of zinc can increase the risk of Powdery Scab.

Sulphur is required to make optimum use of nitrogen and amino acids in the

Potato Nutrition, The Art is in the Appliance of Science

plant. It is a good idea to apply some of the nitrogen as Ammonium Sulphate. High levels of applied sulphur have been shown to improve skin finish and reduce Common Scab. In addition nitrogen as ammonium is less leachable than nitrate based nitrogen. Nitrogen inputs are increasingly under focus as NVZ regulations become more restrictive. It is useful to monitor nitrogen levels in the growing crop with devices such as the N – Tester, available from Yara . If a crop is showing levels of decline in mid season then applications of foliar N, as liquid urea, have been shown to be effective.

Having got the basic nutrition of the potato crop right it is also possible to use nutrition to manipulate and stimulate growth. I have already mentioned the use if foliar nitrogen to extend the life of the crop or correct nitrogen deficiency. Some potato varieties are particularly shy breeders. Phosphate is known to stimulate rooting which in potatoes means tubers. Initially the potato crop is slow to root when it is initiating tubers. Foliar applied phosphate at tuber initiation has been shown to promote tuber numbers in such varieties. The results can be variable, depending on variety and season. More recently foliar Phosphites applied from rosette stage have given good results in promoting rooting and improving uptake from the soil of trace elements. Phosphites have also been shown to stimulate the plants defences against fungal pathogens.

There are many foliar stimulants on the market that contain hormones, amino acids, humic acids and other growth promoters, mostly derived from seaweed and some fortified with nutrients trace elements and sugar. It is often claimed that the application of such products stabilises chlorophyll and proteins, promotes photosynthesis, improves water use and nutrient status and storage life. Generally these products can be used on all agricultural and horticultural crops. Some claim up to 30% yield response. While SAC has not trialled every product and some are better than others, SAC has over the years looked at Cropset, Fulcrum, Marinure, Yeald , Seamac, Poliverdol, Wuxal and Maxicrop and found no significant yield response from any. That is not to say some seaweed products will not give responses on a field scale. It is up to the individual grower to make their own judgement but it is better to get the basic nutrition of the plant right first. In summary a good knowledge of soil nutrients status, previous cropping and any organic inputs allows the agronomist to make recommendations for sound basal fertiliser inputs, predict likely nutrient availability through the growing season and the potential for any nutrient interactions that may result in a need and response from foliar inputs. Good sound technical knowledge takes some of the risk out of growing potatoes and importantly saves time and needless expense.

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