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## CEREAL DISEASE CONTROL

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Major changes in varieties and cereal fungicides will pose a challenge when formulating disease control strategies for year 2001. Strobilurin fungicides will form the backbone of strategies for winter and spring wheat and barley. Appropriate triazole partners will need to be added, as the strobilurins are mainly preventative in mode of action. The emphasis must be on establishing crops with high yield potential and then keeping them clean from an early stage with an appropriate fungicide regime.

### **More Than Double Your Money!**

Typical yield responses to a good fungicide programme in winter wheat would be 3.0-4.0 tonnes/ha (1.2-1.6 t/ac) for an investment of £110/ha (£45/acre). Responses in spring barley would be expected to be 1.2-2.5 tonnes/ha (0.5-1.0 t/ac) for an investment of £60/ha (£24/ac). In addition grain and straw quality and value will be improved. Moreover, there is an element of insurance stabilising yield, quality and income.

### **Which Fungicide?**

There will be over 50 fungicides to choose from on the Irish market in year 2001. Fungicide choice will depend on disease challenge as well as the strengths, weaknesses and costs of available products. Judicious choice of products and rates in strategic programmes will facilitate cost effective disease control. Strobilurin fungicides will be the backbone of programmes. The emphasis must thus be on disease prevention rather than cure as strobilurins work mainly on a preventative rather than curative basis. Table 1 categorises available fungicides into 11 groups based on their active ingredients and indicates the major diseases which are controlled.

## **FUNGICIDES STRATEGIES**

### ***Winter Wheat Strategy: - A 3-Spray Programme is Recommended***

<b>Timing</b>	<b>Target Diseases</b>	<b>Products (rate/ha)</b>
T1 gs 31-32	Septoria?  Hi Eyespot risk? +	Allegro 0.8-1.0L Or Sportak Delta 1-1.25L Or Twist 1.2L+½rate Second generation triazole Unix 0.67-1kg + ½-¾ rate Second generation

	Mildew? +	triazole Mildewcide ½ - 1 rate + above
T2 gs 37-39	Septoria? Rust?  Mildew? +	Allegro 0.8L; Amistar 0.8L or Twist 1.2L + ½ rate Second generation triazole Triazole Full Rate + chlorothalonil 1L Include Mildewcide ½-¾ Rate
T3 gs 51-60	Septoria? Rust? Fusarium?  Mildew? +	Amistar 0.8L + MBC Or Twist 1.2L + Second generation triazole Include Mildewcide ½ Rate

*N.B. Second generation triazoles include: - Opus, Flamenco, Caramba, cyproconazole & tebuconazole products.*

***W. Barley Fungicide Strategy: - A 2-Spray Programme is Suggested***

Timing	Target Diseases	Products
T1 gs 31-32	Eyespot? Rhyncho? Mildew?	Stereo Or Allegro + /- mildewcide Or Punch C or Charisma +/- mildewcide Or Triazole + MBC +/- mildewcide
T2 gs 37-49	Rhyncho? Net Blotch? Rust?	Strobilurin +/- Triazole

***Oats Fungicide Strategy: - A 2-3 Spray Programme is Suggested.***

T1 gs 30-31	Second-Third Node	Flag leaf - Heading
CCC + Broadspectrum Fungicide	CCC + Broadspectrum Fungicide	Strobilurin

Alto, Shandon 100SL, Menara, Folicur or Endeavour are the triazoles of choice on oats as they give very good control of mildew and rust. Include fungicide at appropriate rate when applying CCC. Where mildew is bad include a mildewcide such as a morpholine (e.g. Corbel or Tern) or Impulse. Fortress Duo is a good alternative for mildew control.

***Spring Barley Fungicides: - A 2 Spray Programme is Suggested***

	Spray 1 4/5 Leaf - First Node	Spray 2 Second Node - Flag Leaf
Fractal Crusader Cooper	Triazole ½-1 Rate + Mildewcide ¼-1/2 Rate	Strobilurin +/- Triazole +/- Mildewcide

Laird Blenheim Canasta	Or Stereo 1+ Litre Or Strobilurin ½ Rate (Allegro or Twist + Triazole)	
Optic Century Lux Lamba Newgrange	Triazole ½-1 Rate + MBC or Stereo 1L + MBC Or Strobilurin ½ Rate (Allegro or Twist + Triazole) + MBC	Strobilurin +/- Triazole

### **Note**

a) Mildewcides

- Morpholines: - Corbel, Mistral, Tern, Patrol
- Impulse
- Fortress Duo or Fortress (Fortress on its own gives prevention only)

b) Triazole rating for Net Blotch (prevention mainly)

Very good: Flusilazole (Punch C, Lyric, Sanction), Epoxyconazole (Opus).

Good: Propiconazole (Tilt, Radar, Bolt and mixtures), Tebuconazole (Folicur and mixtures).

The inclusion of a morpholine with a triazole significantly improves Net Blotch control. Products include Glint, Gladio, etc.

- c) Strobilurins: Amistar and Twist are the best available fungicides on Net Blotch but are largely preventative only. Allegro is very good on Net Blotch.
- d) The newer triazoles metconazole, fluquinconazole, cyproconazole, tebuconazole and epoxyconazole are superior on mildew to the older triazoles.
- e) See Table 1 for details on fungicide active ingredients.

**Table 1: - Fungicides for Cereals 2000 Recommended Retail Prices (ex VAT) Teagasc**

Group	Trade Name	Agent	Active Ingredient	Rate/ha	£/Container	£/Ha	Major Use
1. Triazoles	Opus	BASF	Epoxiconazole 125g/L	1L	33/1L	33	Broadspectrum Disease Control
	Folicur	Bayer	Tebuconazole 250g/L	1L	144.5/5L	28.9	
	Tilt/Bolt/Radar	Novartis/Barclay/Zeneca	Propiconazole 250g/L	0.5L	29/1L	14.5	
	Sanction	Zeneca	Flusilazole 400g/L	0.4-0.5L	57.5	23+	
	Lyric	Dupont	Flusilazole 250g/L	0.625-0.8L	49.5/1.25L	24.7+	
	Score	Novartis	Difenoconazole 250g/L	0.3-0.5L	60/1L	18	
	Shandon 100SL (Alto 100SL)	Barclay	Cyproconazole 100g/L	0.8L	29/1L	23.2	
	Menara	Novartis	Propiconazole 250g/L + Cyproconazole 160g/L	0.5L	60/1L	30	
	Endeavour	Bayer	Propiconazole 250g/L + Tebuconazole 250g/L	0.4-0.5L	72.1/1L	28.8+	
	Caramba	Cyanamid	Metconazole 60g/L	1.5L	-	-	
	Flamenco	Aventis	Fluquinconazole 100g/L	1.5L	65.25/3L	32.6	
	Eyetak/Mirage	Barclay/Novokem	Prochloraz 400g/L	1L	65/5L	13	Eyespot and Broadspectrum Disease Control
	Sportak 45	Interchem	Prochloraz 450g/L	0.9L	142/5L	25.5	
	Sportak Delta	Interchem	Prochloraz 320g/L + Cyproconazole 48g/L	1.25L	81.1/2.5L	40.5	
	Flamenco Plus	Aventis	Prochloraz 174g/L + Fluquinconazole 54g/L	2.3L	-	-	
	Bumper P	Novokem	Prochloraz 400g/L + Propiconazole 90g/L	1L	-	-	
2. Triazoles + MBC	Punch C/Contrast	Interchem/Dupont	Flusilazole 250g/L + MBC 125g/L	0.625-0.8L	52.5/1.25L	26.2	Broadspectrum Disease Control
	Sportak Alfa	Interchem	Prochloraz 266g/L + MBC 100g/L	1.5L	61.4/3L	30.7	
3. Triazoles + Morpholine	Opus Team	BASF	Epoxiconazole 84g/L + Fenpropimorph 250g/L	1.5L	142.5	42.7	Broadspectrum Disease Control
	Glint	Novartis	Propiconazole 125g/L + Fenpropimorph 375g/L	1L	56/2L	28	
	Coldstar	Interchem	Flusilazole 160g/L + Fenpropimorph 375g/L	1L	73.5/2L	36.7	
	Folicur Forte	Bayer	Tebuconazole 200g/L + Fenpropidin 300g/L	1.0-1.25L	40.2/1L	40.2+	
4. MBC	Bavistin DF	BASF	Carbendazim 50%	0.5kg	8/1kg	4.1	Mixer for Improved Rhynchosporium and Fusarium Control
	KC/Carbazol/MB	Kapchem/Unichem/DHM	Carbendazim 500g/L	0.5L	21.5/2L	5.3	
	Benlate	Interchem	Benomyl 50%	0.5kg	25/1kg	12.5	
5. Morpholines	Corbel/Mistral	BASF/Novartis	Fenpropimorph 750g/L	1L	27/1L	27	
	Tem/Patrol	Novartis/Unichem	Fenpropidin 750g/L	1L	31	31	
6. Contacts	Bravo/Baton SC/Clortosip/Corrib/KC	Novartis/Bayer/Unichem/Barclay	Chlorothalonil 500g/L	1-2L	35/5L	7.0+	Mixer for Improved Septoria Control
	Maneb	Various	Maneb 80%	2.25kg	76/25kg	6.8	
7. Oxazolidinediones (OADs)	Charisma	Interchem	Famoxadone 100g/L Flusilazole 106.7g/L	1.5L	78/3L	39	Broadspectrum Disease Control
8. Strobilurin	Amistar	Zeneca	Azoxystrobin 250g/L	1L	205/5L	41	Broadspectrum Disease Control Preventative mainly + Green-leaf Enhancement
	Amistar Pro	Zeneca	Azoxystrobin 100g/L + Fenpropimorph 280g/L	2L	114/5L	45.6	
	Allegro	BASF	Kresoxim-methyl 125g/L + Epoxiconazole 125g/L	1L	52/1L	52	
	Twist	Novartis	Trifloxystrobin 125g/L	1.2L +/-	133/5L	39.9	
9. Pyrimidinamine	Stereo	Novartis	Cyprodinil 250g/L + Propiconazole 62.5g/L	1.6-2.0L	95/5L	30.4	Eyespot + Broadspectrum disease control
	Unix	Novartis	Cyprodinil 750g/kg	0.67-1.0kg	89/2.5kg	23.8+	
10. Quinoline	Fortress	Zeneca	Quinoxifen 500g/L	0.2-0.3L	84/1L	16.8+	Mildew prevention
	Fortress Duo	Zeneca	Quinoxifen 66.7g/L + Fenpropimorph 250g/L	1.0-1.5	52/3L	17.3	
11. Spiroketalamines	Impulse	Bayer	Spiroxamine 500g/L	1.5L	59.6/3L	29.8	Mildew control but some effect on Rusts, Rhyncho. N. Blotch
	Beam	Bayer	Spiroxamine 250g/L + Tebuconazole 133.3g/L	1.5L	58/3L	29	Broadspectrum

## SPRING BARLEY FUNGICIDE TRIAL

Objective: Comparison of fungicides for disease control and yield response in spring barley.

Site: Kildalton College, Co. Kilkenny

Cultivar: Cooper

Sowing Date: 15<sup>th</sup> March

Previous Crop: Spring Barley

Fungicide Applications: T1: Glint 0.5 l/ha on 15<sup>th</sup> May

*\* Note these treatments in particular*

	T2 Applied 13/6	Notes
1.*	Amistar 0.8 l/ha + Opus 0.5 l/ha	
2.	Amistar Pro 2.0 l/ha	
3.*	Amistar 0.8 l/ha + Fortress Duo 1.5 l/ha	
4.*	Twist 1.5 l/ha + Menara 0.4 l/ha	
5.*	Sphere 1.0 l/ha + Unix 0.4 kg/ha	
6.	Charisma 1.25 l/ha + Allegro 0.4 l/ha	
7.	Charisma 1.25 l/ha + Amistar 0.5 l/ha	
8.	Charisma 1.25 l/ha + Twist 0.75 l/ha	
9.	Punch C 0.625 l/ha + Amistar 0.8 l/ha	
10.	ZA 406 1.0 l/ha	
11.	Amistar 0.75 l/ha + Allegro 0.5 l/ha	
12.*	Allegro 0.8 l/ha + Corbel 0.2 l/ha	
13.	BAS33F 1.5 l/ha	
14.	BAS34F 1.5 l/ha	
15.	BAS35F 1.5 l/ha	
16.	Amistar 1.0 l/ha + Beam 1.0 l/ha	
17.	Twist 1.0 l/ha + Beam 1.0 l/ha	
18.	Caramba 1.0 l/ha + Amistar 0.8 l/ha	
19.*	Caramba 1.0 l/ha + Twist 1.0 l/ha	
20.*	Untreated	
	Zenica No. 3 (New Strob + Stereo)	

## WINTER WHEAT FUNGICIDE TRIAL

Objective: Comparison of fungicide programmes on basis of disease control, yield, quality and margin over materials

Site: Kildalton College

Cultivar: Madrigal

Sowing Date: 8/10/99

Previous Crop: Winter Oats

N: 200 kg/ha (160 units/acre)

Fungicide Sprayed:

T1	T2	T3
27/4	17/5	13/6

**Treatments - Fungicide Programmes Kildalton 2000** (\* Note these treatments)

No.	Treatment	Timing	Rate l/ha	Notes
1.*	Unix + Opus Opus + Amistar Amistar	31/32 37/39 59	0.5 + 0.5 0.3 + 0.8 0.8	
2.*	Allegro Opus + Amistar Amistar	31/32 37/39 59	1.0 0.3 + 0.8 0.8	
3.	Sportak Opus + Amistar Amistar	31/32 37/39 59	0.9 0.3 + 0.8 0.8	
4.	Sportak + Allegro Opus + Amistar Amistar	31/32 37/39 59	0.45 + 0.5 0.3 + 0.8 0.8	
5.	Flamenco Plus Opus + Amistar Amistar	31/32 37/39 59	2.3 0.3 + 0.8 0.8	
6.	Flam Plus + Amistar Opus + Amistar Amistar	31/32 37/39 59	1.5 + 0.5 0.3 + 0.8 0.8	
7.	Unix + Allegro Opus + Amistar Amistar	31/32 37/39 59	0.5 + 0.5 0.3 + 0.8 0.8	
8.	Unix + Opus Allegro Amistar	31/32 37/39 59	0.5 + 0.5 0.8 0.8	
9.	Unix + Opus <b>Opus + Twist</b> Amistar	31/32 37/39 59	0.5 + 0.5 0.3 + 1.2 0.8	
10.*	Unix + Opus <b>Opus + Amistar</b> Amistar + Caramba	31/32 37/39 59	0.5 + 0.8 0.3 + 0.8 0.8 + 1.0	
11.* new	Unix + Opus BAS33F Amistar	31/32 37/39 59	0.5 + 0.5 1.5 0.8	
12.	Unix + Opus Opus + Amistar Caramba + Bravo	31/32 37/39 59	0.5 + 0.5 0.3 + 0.8 1.5 + 1.5	
13.	Unix + Opus Opus + Amistar Twist	31/32 37/39 59	0.5 + 0.5 0.3 + 0.8 1.2	
14.*	Allegro + Arma Allegro + Arma Amistar + Arma	31/32 37/39 59	0.5 + 0.5 + 0.5 +	
15.	Unix + Opus Opus + Amistar + Arma Amistar + Arma	31/32 37 + 45 59	0.5 + 0.5 0.2 + 0.55 0.55	
16.*	Unsprayed			

# WINTER WHITE LUPINS

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## AGRONOMIC GUIDELINES

Lupins are a rich source of plant protein, second only to soya beans in protein content. Protein levels are in the range 38-42% as against 24-28% for beans and peas. Lupins, because of their size, handling characteristics and protein content, are much in demand from feed compounders. The absence of tannins and other anti-nutritional factors opens up the non-ruminant feed market to a home-produced source. On the basis of a 10% inclusion rate this market alone would absorb the production from about 25,000 hectares.

The successful introduction of lupins into Irish agriculture would provide, for the first time, a home-grown substitute for imported soya protein. Home-grown protein would have the added advantage of traceability.

## PRODUCTION GUIDELINES

- Variety: Ludet, a blue flowered semi-dwarf variety
- Soil Type: Light to medium well drained soils with a pH below 7.0. Lupins will not thrive on soils with a pH of 7.0 or above.
- Rotation: Ideally following a cereal, with a four-year break between Lupin crops.
- Sowing Date: Is the most critical factor in Lupin production. Sowing too early in September results in too much vegetative growth the following spring. The result is very tall-branched crops which have a low yield potential and are very prone to early lodging. Sowing too late (October) can lead to dwarf plants with, again, a low yield potential. The main problems encountered in the 1998/'99 season were due to too early sowing. Based on the UK experience and limited Irish experience, the preferred sowing date is now expected to be from the 15-22 September in inland locations and a week later in coastal areas.



Seed Rate: Remains at 35-40 seeds/ m<sup>2</sup> (84-100 kg/ha).

Seedbed: Create a fine seedbed to facilitate good establishment and weed control.

Bean Fly/Slugs: Both of these pests caused serious plant losses in the 1998 sowing season. For 1999 sowings the following should be followed carefully:

1. Apply Dursban before drilling - spraying after drilling will not give good control. The passage of the drill will give sufficient incorporation.
2. Roll using a Cambridge roller only, after sowing. This will help control both slugs and Bean-fly.

# **GROWING MAIZE SILAGE**

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Over the past few years maize has become a significant feature on many livestock farms. This development is based mainly on the proven reputation of maize to produce top quality silage, capable of increasing intakes and yields. Like many reputations, there are two sides to the story. While good quality maize, 28% DM and 25% starch is the best winter forage you can have on the farm, too much of the maize harvested in recent years falls far short of these targets. If you are growing maize, then every effort should be made to produce a high quality product, particularly since it costs the same to produce good quality as poor quality. The main factors affecting quality are variety, sowing date, weed control, harvest date and the use of plastic.

## **Variety**

Use only Department of Agriculture recommended varieties, all these are early type varieties capable of producing a mature cob by mid-October. In less favourable sites, the variety Nancis, while having a lower yield potential will produce a mature crop ahead of all other varieties.

## **Sowing Date**

The target date for sowing maize is April 20<sup>th</sup>, (when soil temperatures have reached 8°C for three consecutive days) a week or so earlier in the South or in frost free areas. Try to complete sowing by May 10<sup>th</sup>. After this, grain yield (starch content) and D.M. content (DM%) will decline sharply, the two quality factors which give maize silage its advantages over grass silage. Trials at Oak Park have shown that for late sown crops, while total yield declines by around 15%, grain yield declines by up to 50%.

## **Weed Control**

Maize grows extremely slowly in April/May and in most years during June. It is normally early July before a maize crop can look after itself and smother out weeds. If weeds are left unchecked during late April/May i.e. until the weeds are 4 to 6 inches tall than you can expect a serious loss in total yield and grain (starch content). A range of herbicides are

available to cover almost every weed, but the timing is all important. For post-emergence herbicides, spray as soon as the field greens over and before the weeds get to the four-leaf stage.

### **Harvest Date**

There is no one date for harvesting maize. Harvest when the crop is mature i.e. when the grain has reached a dry matter content (DM%) of 50 to 55% and there is still some green leaf and stem present. If frost kills off the plants, then there is no choice but to harvest as soon as possible, but examine the crop carefully. A crop can look very damaged at the headlands, but a walk through the crop can reveal a lot of green leaf and stem - so don't be rushed.

### **Plastic**

Growing maize under plastic is one way of significantly increasing the quality of the crop. Research at Oak Park and U.C.D. Lyons have shown that using plastic will, on average increase total dry matter yield by 4.2 t/ha (1.7 t/ac). More importantly most of the increase (80%) has come in the form of grain (starch). In addition the maize crop will mature, in late September, up to three weeks ahead of non-plastic crops.

# **TRAINING COURSES**

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Teagasc offers courses related to crop production in the following areas:

## **CERTIFICATE IN FARMING**

This course is targeted at young people interested in a career in farming and in jobs in the agricultural industry. The first year is in an agricultural college where students gain skills and knowledge relating to soils and plants, animal and crop production, farm management, machinery, enterprise development and management, the environment, farm buildings, personal development and health and safety. About half the course consists of practical/skills training. Typically students spend half of each day on the farm and workshops and half at classroom work. Computer applications are an important part of the course.

In Kildalton, students are given an option to pursue mainly tillage/drystock subjects, thereby keeping the training relevant to the home farm. The second year is delivered at local Teagasc training centres and consists of supervised on-farm work experience when students participate in all on-going work on a farm and keep prescribed records and accounts. A minimum of three months must be spent on supervised work experience on a host farm. Towards the end of the second year, students attend a management training course of 3 weeks duration at a local training centre or at an agricultural college.

## **DIPLOMA IN MACHINERY AND ARABLE CROPS**

This is a new course which commenced at Kildalton College in 1999, in response to demand from:

- Tillage farmers
- Tillage farmers/contractors
- Those seeking a career in machinery

- Agricultural contractors

The major emphasis is on the skilful operation and management of a wide range of farm and arable crop machinery. The course content also includes:

- Maintenance and repair of tractors and tillage machinery
- Workshop practice, welding, fabrication
- Business management and information technology
- Crop production and management
- Environmental considerations

In the work experience year, students can spend time on tillage farms, with agricultural contractors, in machinery dealerships and garages. Some of the time can be spent abroad.

Graduates of the course will find employment on the home farm, on commercial tillage farms, with machinery contractors and in dealerships as machinery demonstrators and sales representatives.

### **Course Structure and Entry Requirements**

The courses, which begin in September, consist of two phases:

**Phase 1:** The Certificate in Agriculture from the one year agricultural college course or The course work (excluding the Management Module) of the local option of the Certificate in Farming.

Candidates for the Diploma Courses are selected by interview, after they have completed one of the above courses.

**Phase 2:** Twenty-one month period

- a) September to February - course work in college
- b) March to February - supervised work experience in selected farms, dealerships or garages
- c) March to end of May - course work in college

Opportunities will be available to complete some of the work experience abroad.

## **ADVANCED CERTIFICATE IN TILLAGE CROP MANAGEMENT**

### **Objectives**

Modern tillage farming requires a wide range of technical and management expertise. The objective of this course is to increase the farm income of the participants by enabling them to use better technology and management practices. Reducing costs of production and improving crop yield and quality will be the central themes throughout the course. Three such courses will commence this autumn in Clonmel, Enniscorthy and Warrenstown.

The course will cover the latest technology, information and management skills that are essential for successful tillage farming in such areas as:

- Crop nutrition
- Weed disease and pest control
- Alternative crops
- Financial management
- Crop storage and marketing
- Pesticide application and handling
- Tillage machinery
- Computers

### **Structure**

The course will be run on the basis of one-day modules spread throughout the year over a two-year period. This will enable the participants to chart the progress of a range of crops right through the growing season. The course will revolve around critical crop management decisions and acquiring the knowledge and skills to make correct decisions. Participants will be expected to keep accurate records of the cropping programme on the home farm and these will be the subject of detailed analysis.

### **Eligibility**

As this is an advanced course, participants will need to have a good knowledge of modern tillage farming and be working as tillage farmers. People born after 1/1/1968 will normally be expected to have completed the Certificate in Farming or an equivalent training programme.

People born before that date should have appropriate agricultural education and experience in tillage farming.

### **Sprayer Operator Courses**

Teagasc is now organising courses for sprayer operators at locations throughout the country.

- With ever increasing emphasis on Food Safety and Quality, it is vitally important that everybody involved in the application of pesticides is properly trained.
- Legislation that will make it a legal requirement for sprayer operators to undergo a recognised training course is on the way.
- Training in the safe use of pesticides will help farmers and horticulturists to comply with the Cereals Association of Ireland Grain Assurance Scheme, the Bord Glas Assurance Schemes and crop production protocols being introduced by supermarkets.
- A properly maintained sprayer and a well-trained operator will result in less wastage of pesticides and better control of pests, weeds and diseases.

### **Course Content**

- Pesticide use - public concerns
- Pesticides - formulation, composition, hazards
- Sprayer calibration and checks
- Sprayer operation
- Washing out, disposal of containers
- Pesticide storage, record keeping
- Protective wear
- First aid
- The courses, which will be run over two days, will be held at local Teagasc Offices and agricultural/horticultural colleges.
- An on-farm inspection of equipment and facilities will be an option at a small additional charge.
- Following an end of course assessment, participants will be awarded a certificate of competence.

# SPRAYING

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Teagasc training courses for sprayer operators cover a wide range of topics in detail and in a "hands-on" way. In the following I have highlighted some of the topics that are covered in the training course which are of particular interest to sprayer operators.

## CALIBRATION

All sprayers need to be calibrated. A number of different methods can be used to calibrate sprayers. The use of application rate charts and calculations with formulae are the two most common methods. Essentially, calibration is the interaction between, forward speed, nozzle spacing and nozzle output to give the intended application rate. Nozzle output is an interaction between pressure and nozzle size and can be measured in a graduated measuring container and checked against the nozzle chart for that particular nozzle.

Modern tractors and sprayers have electronic control and monitoring equipment, which allow a greater degree of accuracy. However, it is important that the accuracy of these systems be regularly checked also.

## FORMULAE FOR CALIBRATING SPRAYERS

Using formulae can be daunting, but if you give it some time to get familiar with the method and you use a calculator it can make the job of calibrating very easy. Be sure to use the units (e.g. lit. /ha) exactly as indicated in the formula.

Nozzle output (lit/min) = Application rate (lit/ha) x forward speed (kph) x nozzle spacing (m)/600

Forward speed (kph) = Nozzle output (lit/min) x 600/Application rate (lit/ha) x nozzle spacing (m)



Use this formula if you want to find out what speed you need to drive at. You must know all the other values in the formula.

Application rate (lit/ha) = Nozzle output (lit/min) x 600/ forward speed (kph) x nozzle spacing (m)

Note: The formulae above are different variations of the same formula.

Kph = kilometres per hour, m = metres,

Gals/ac x 11.2 gives litres per hectare (lit/ha)

### **Measuring Forward Speed**

Time how long it takes to travel a measured distance and calculate the forward speed using the following formula:

Forward speed (kph) = 3.6 x distance measured (m) / time to travel the distance (seconds)

### **Calibration Example**

Say, if:

Nozzle output = 1.3lit. /min

Forward speed = 7.8 kph

Nozzle spacing = 0.5m

What would the application rate be?

Application rate (lit. /ha) = Nozzle output (lit/min) x 600/ forward speed (kph) x nozzle spacing (m)

$$= 1.3 \times 600 / 7.8 \times 0.5$$

$$= 780 / 3.9$$

$$= 200 \text{ lit/ha}$$

Note: 600 is just a number and is always the same for this formula.

## NOZZLE OUTPUTS

The usual measuring method is with a measuring cylinder and watch. A stop-watch makes the task quicker and more accurate.

The sprayer nozzles should pass two tests:

- (i) The output of each jet should be within  $\pm 10\%$  of the average output of the set. If they are not, first check that they are all the same size, and that nozzle and filter are clean. If that does not solve the problem, a new set is needed.
- (ii) The average output of the jets should be within 10% of the chart figure. If the difference is bigger, then one of two things is wrong: the pressure gauge is reading wrong, or the nozzles are worn.

Fit three new nozzles on the sprayer and measure their outputs. If they still do not tally with the chart, then the gauge is the problem. Get a new gauge and start again. If the old nozzles gave an output more than 10% higher than the new ones, they are worn and the whole set needs to be replaced. With cone nozzles, discs and cores should be changed together.

## STANDARDISATION OF NOZZLE OUTPUTS

The nozzle chart in Table 1 is standard for all new fan nozzles and drift-reducing nozzles. Different types of old nozzles require separate nozzle charts. In the ISO chart (International Standards Organisation) the colour indicates the size.

Multiples of the size are equivalent to multiples of the output at a particular pressure (e.g. 04 @3 bar is twice 02 @ 3 bar). 0.4 multiplied by any nozzle size is equal to the output @ 3 bar (e.g. 0.4 x 02 is 0.8 litres/min)

**Table 1: Output of ISO fan nozzles**  
(All new fan nozzles, BubbleJet, DriftBeta etc.)

Nozzle size	01	015	02	03	04	05	06	08
Colour (ISO)	Orange	Green	Yellow	Blue	Red	Brown	Grey	White
Colour (old Lurmark, Allman)	Pink	Light brown	Orange	Red	Cambridge blue	Yellow	Lime green	Moss green
Pressure (bar)	Nozzle output (litres/min)							
1	0.23	0.35	0.46	0.69	0.92	1.15	1.39	1.85
1.5	0.28	0.42	0.57	0.85	1.13	1.41	1.70	2.26
2	0.33	0.49	0.65	0.98	1.31	1.63	1.96	2.61
2.5	0.37	0.55	0.73	1.10	1.46	1.83	2.19	2.92
3	0.40	0.60	0.80	1.20	1.60	2.00	2.40	3.20
3.5	0.43	0.65	0.86	1.30	1.73	2.16	2.59	3.46
4	0.46	0.69	0.92	1.39	1.85	2.31	2.77	3.70
4.5	0.49	0.73	0.98	1.47	1.96	2.45	2.94	3.92
5	0.52	0.77	1.03	1.55	2.07	2.58	3.10	4.13

### Drift-reducing Nozzles

Considerable progress has been made in the design of nozzles that produce less drift-prone spray. Most of these nozzles are interchangeable between sprayer makes, and offer a relatively cheap way of reducing drift. However, the efficacy of the treatment needs to be maintained, and this includes making sure that the droplet size spectrum is appropriate to the treatment.

Several new nozzles are now available which greatly reduce spray drift:

- Nozzles with restrictor plates to reduce pressure; these are now on offer from the following:  
Lurmark Lo-Drift: McHugh & Kramp, Broomhill Industrial Estate, Tallaght, Dublin 24.  
Tel. 01 4519222  
Hardi-ISO LD: IAM Agricultural Machinery, Kilkenny. Tel. 056 65826  
Berthoud NOZAL RLX/ALX: Armer-Salmon Ltd., Carlow. Contact: Percy Gaule Tel. 0503 42382 or 087 2350723
- Nozzles which induce air into the spray stream, e.g. Lurmark Drift Beta, Hardi InJet, Berthoud NOZAL RRX/ARX, or the Billericay Bubble Jet sold by Farmec Ltd., Drumree, Co. Meath. Contact: Gary Daly Tel. 01 8259289
- Flood-jet nozzles, such as the Spraying Systems TurboTeejet, which is sold in Ireland by Farmhand Ltd, Castleknock, Dublin. Tel 01 8213455

The restrictor-plate nozzle can reduce drift by up to half: the air-inclusion and flood-jet nozzles have the potential to achieve a further halving of drift.

These nozzles reduce drift by producing bigger droplets. This may reduce the efficacy of some treatments, such as contact herbicides on cotyledon weeds, or graminicides. A reduction in efficacy is more likely if a small nozzle size and a low water volume are used. However, for many treatments, big reductions in drift can be made without any significant effect on the efficacy of the treatment.

### **Suggested Nozzle Combinations for Various Sprayers:**

Table 2 includes a list of suggested nozzle combinations for various makes of sprayer. Operators could select from this list, depending on the pesticides they apply and the spray volumes required.

***Table 2: Suggested nozzle combinations for various sprayers***

<b>Nozzle</b>	<b>Spray volume</b>	<b>Berthoud</b>	<b>Old Hardi</b>	<b>Other</b>
1	10-15 gal/acre	12W cone	4110-14 fan	No.02 or 03 fan
2	18-25 gal/acre	18W or 15B cone	4110-20 fan	No. 04 fan
3	25-30 gal/acre	18B cone	4110-24 fan	No.05 fan
4	18-25 gal/acre	Any air-induction low-drift nozzle (size to match nozzle 2)		

### **Suppliers of Pressure Gauges**

- Sprayer Importers/Distributors (i.e. original parts)
- McHugh & Kramp, Broomhill Industrial Estate,  
Tallaght, Dublin 24. Tel. 01 4519222
- Manotherm Ltd., 4 Walkinstown rd., Dublin 12. Tel. 01 4522355

### **Graduated Measuring Containers and Stop Watches**

Graduated cylinders are good for measuring nozzle outputs and are available from Laboratory Supplies Companies (see Golden Pages / Business Listings). Stopwatches can be got in Sports shops.

### **Examples and Prices of a Range of Personal Protective Equipment**

		<b>Prices + VAT @21% IR£</b>
Coveralls	Tyvek - Pro-Tech (white) Type 5 & 6	4.17
	Microgard 3000 (yellow) Type 3 & 4	6.89
	Green PVC Re-usable Overall	16.42
Gloves	Nitrile Rubber Gloves (13")	1.36
	Nitrile Gauntlet Rubber Gloves (18")	3.16
	Neoprene Black Flock Lined (13")	1.46
Eye & Face Protection	Pulsafe VX2041 Goggles - Vistamax	7.40
	Uvex Ultra Vision Goggles	13.57
	Racal acetate visor headband & chinguard	11.99
	Racal polycarbonate visor headband & chinguard	7.72
Disposable Face Masks (P2)	Racal Delta	1.11
	3 M 8810	1.27
	Moldex 2405 P2 valved mask	1.71
Respirators	Sundstrom SR90 Half Mask	24.39
	Sundstrom P3 High Efficiency Dust Filter	4.64
	Sundstrom ABEK Filter	7.13
	Silner 12 Half Mask (Twin Filter)	13.63
	Silner 91 P3 Filter	5.10
	AilnerA1B 1E1K1 Combination Filter	6.81
	Moldex 8201 Mask c/w/ ABEK Filter	17.60

### **Suppliers of Protective Clothing and Equipment**

Many stores stock suitable protective clothing. Should you not be able to obtain suitable supplies, contact any of the following or consult the "Golden Pages".

<b>Company Name</b>	<b>Tel. No</b>
Davies Safety Ltd., 535 North Circular Road, Dublin 1	01-8363027
M.A. Healy & Sons Ltd., Wexford Road, Arklow, Co. Wicklow	0402-32116
Orrwear Protective Supplies Ltd., 40-42 Hill Street, Dublin 1	01-8743382
Penta Products (Ireland) Ltd. Safety Wear, Unit 12, Stillorgan Ind. Park, Blackrock, Co. Dublin	01-2950320 / 2888052
Portwest, Charles Hughes, Ltd., Altamont Street, Westport, Co. Mayo	098-25177
Donal O'Sullivan Safety Unit, Y2 Block V, Ballymount Drive, Dublin 1	01-4504056
Total Safety Ltd., Newmarket Square, Dublin 8	01-4544955
Total Safety Ltd., Clyde House, Lr. Glanmire Road, Cork	021-314833
Highway Safety, Knocktopher, Co. Kilkenny	056-68702 / 68740

***Recognising Filters***

<b>Letter/no.</b>	<b>Colour</b>	<b>Intended use</b>
A (Type 1,2 or 3)	Brown	Organic gases and vapours (most spray chemicals)
B (Type 1,2 or 3)	Grey	Inorganic gases and vapours (eg slurry gas, H <sub>2</sub> S)
E (Type 1,2 or 3)	Yellow	Acid gases and vapours
K (Type 1,2 or 3)	Green	Ammonia
P (Type 1,2 or 3)	White	Particulates/dust

Type 1, 2 or 3 indicates the level of protection/how long it lasts in use. Type 3 gives the highest protection. Type 2 or greater is required to protect against spores that cause farmers lung.

## **CROP MARGINS**

***Jerry McCarthy, Teagasc, Moorepark***

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***Jim O'Mahony, Teagasc, Kildalton College***

*Phone: + 353 51 643105; Email: [jomahony@kildalton.teagasc.ie](mailto:jomahony@kildalton.teagasc.ie)*

The margins given here should provide a useful guide but land suitability, rotation, risk avoidance and convenience should also be considered. There is little difference in margins between spring and winter cereals. However, winter wheat well done (suitable soils/location) will continue to be more profitable than other feed cereals. Bonuses for quality will be more important than ever.

In the case of malting barley and sugar beet, the availability of contracts and fulfilment of contract requirements may limit the attainment of these margins.

Margin per acre is influenced substantially by EU aid which may now represent close to 100% of net margin. Thus area aid for crops and livestock premia must be properly processed.

## **COSTS**

Level of yield has a major influence on profitability. Decisions on input strategies must be tailored for individual fields and farms.

Timeliness and attention to detail in the carrying out of all operations are vital to maintaining profitability in crop production. All costs (direct and fixed) need to be kept to a minimum, consistent with good husbandry practices.

Fixed costs will need closer attention than hitherto. In particular, investments in machinery and land/conacre will need thorough financial appraisal before a decision is taken.

***Note:*** *Prices in tables include VAT.*

# Cereal Crop Margins 2001 - Jim O'Mahony

Variable Costs inc. VAT (£/Acre)

Revised

4-Jul-00

		Wheat		Feed Barley		Malting Barley	Feed Oats	
		Feed	Milling					
		Winter	Spring	Winter	Spring		Winter	Spring
<b><u>MATERIALS</u></b>		<u>158</u>	<u>126</u>	<u>142</u>	<u>99</u>	<u>97</u>	<u>121</u>	<u>104</u>
Seed		21	21	20	19	19	20	20
Fertilisers		52	41	43	32	30	43	32
Sprays:								
Herbicides		15	10	15	10	10	12	10
Fungicides		54	44	41	29	29	30	30
Insecticides		13	9	13	9	9	13	9
Growth Regulators		3	1	10	0	0	3	3
<b><u>HIRE MACHINERY</u></b>		<u>102</u>	<u>102</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>	<u>98</u>
Plough, Till and Sow		40	40	40	40	40	40	40
Spray		18	18	14	14	14	14	14
Fertiliser Spreading		9	9	9	9	9	9	9
Harvesting		35	35	35	35	35	35	35
<b><u>MISCELLANEOUS</u></b>		<u>21</u>	<u>15</u>	<u>18</u>	<u>12</u>	<u>12</u>	<u>18</u>	<u>12</u>
Interest (10%)		10	5	8	4	4	8	4
Transport (£3/Tonne)		11	10	10	8	8	10	8
<b>TOTAL VARIABLE COSTS</b>		281	243	258	209	207	237	214
Tonnes to cover variable costs		3.7	2.8	3.6	2.9	2.4	3.3	3.0
<b>Net Price (£/Tonne)</b>		76	86	72	72	86	72	72
AID (£/Acre)		117	117	117	117	117	117	117
Straw (£/Acre)		30	25	40	35	35	40	35
<b>Gross Margins (£/Acre)</b>								

		Wheat		Feed Barley		Malting Barley	Feed Oats	
		Feed	Milling					
		Winter	Spring	Winter	Spring		Winter	Spring
Tonnes/Acre								
	2.00	18	71	44	88	118	65	83
	2.50	56	114	80	124	161	101	119
	2.75	75	135	98	142	182	119	137
	3.00	94	157	116	160	204	137	155
	3.25	113	178	134	178	225	155	173
	3.50	132	200	152	196	247	173	
	3.75	151	221	170			191	
	4.00	170		188				



### Non Cereal Margins 2001 - Jim O'Mahony

Variable Costs inc. VAT (£/Acre)

	<b>Sugar Beet</b>	<b>Peas</b>	<b>Lupins</b>	<b>Beans</b>		<b>Oilseed Rape</b>		<b>Linseed</b>
		<b>Batchelors</b>		<b>Winter</b>	<b>Spring</b>	<b>Winter</b>	<b>Spring</b>	
<b>MATERIALS</b>	<u>207</u>	<u>131</u>	<u>105</u>	<u>98</u>	<u>95</u>	<u>143</u>	<u>80</u>	<u>52</u>
Seed	31	47	45	30	30	13	13	15
Fertilisers	84	21	21	21	21	71	52	20
Sprays:								
Herbicides	60	38	16	10	16	28	0	17
Fungicides	12	23	11	35	26	25	0	0
Insecticides	20	2	12	2	2	6	15	0
<b>HIRE MACHINERY</b>	<u>160</u>	<u>107</u>	<u>88.5</u>	<u>97.5</u>	<u>93</u>	<u>130.5</u>	<u>97</u>	<u>92.5</u>
Plough, Till and Sow	60	40	40	40	40	40	40	40
Roll	0	4	0	0	0	4	4	4
Spray	18	13.5	9	18	13.5	18	13.5	9
Fertiliser Spreading	9	4.5	4.5	4.5	4.5	13.5	4.5	4.5
Swathing	0	0	0	0	0	20	0	0
Harvesting	73	45	35	35	35	35	35	35
<b>MISCELLANEOUS</b>	<u>70</u>	<u>13</u>	<u>14</u>	<u>15</u>	<u>9</u>	<u>14</u>	<u>6</u>	<u>4</u>
Interest (10%)	10	5	9	4	3	7	3	2
Transport (£3/Tonne)	60	5	5	8	6	5	3	2
Bird Control	0	3	0	3	0	2	0	0
<b>TOTAL VARIABLE COSTS</b>	437	251	207.5	210.5	197	287.5	183	148.5
Output to cover variable costs								
Tonnes/acre	11.2	1.5	1.8	2.4	2.2	2.5	1.6	1.9
<b>Net Price (£/Tonne)</b>	39	171	118	88	88	115	115	80
Area aid (£/Acre)		143	143	143	143	151	151	149
<b>Gross Margins (£/Acre)</b>								

		<b>Sugar Beet</b>	<b>Peas</b>	<b>Lupins</b>	<b>Beans</b>		<b>Oilseed Rape</b>		<b>Linseed</b>
			<b>Batchelors</b>		<b>Winter</b>	<b>Spring</b>	<b>Winter</b>	<b>Spring</b>	
Tonnes/Acre	0.50							26	41
	0.75							54	61
(S Beet only)	1.00		63	54	21	34	-22	83	81
(14)	1.25	109	106	83	43	56	7	112	101
(16)	1.50	187	149	113	65	78	36	141	121
(18)	1.75	265	191	142	87	100	65	169	
(20)	2.00	343	234	172	109	122	94	198	
(22)	2.50	421	320	231	153	166			

***Arable Aid Payments (£/ac)***

	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
Cereals	111	118	124	122
Setaside	140	118	124	122
Proteins	160	145	143	140
Linseed	214	177	149	122
Oilseeds	188	173	151	122
Maize	106	112	118	116

# CROPS AT KILDALTON COLLEGE

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## 1999 PERFORMANCE

### Overview

What follows is an outline of the physical and financial performance of the *cereal crops* (excluding Department trials) grown in the college. All grain (except Winter Oats) was kept for animal feed within the college, therefore grain price at harvest was used in calculating the gross margins. Similarly, all straw is used within the college, so 1999 straw prices were used in the calculations.

### WINTER OATS

Average Yield:	10.1 t/ha	Variety:	Barra
Average Moisture:	19.0%	Sowing Date:	12/10/98

Costs:	<b><u>£ / ha</u></b>
<i>Materials (seed, fertilisers, sprays)</i>	180
<i>Machinery</i>	220
<i>Miscellaneous</i>	<u>45</u>
Total Variable Costs	445

Returns:	
<i>Net Price (£93/t)*</i>	939
<i>Area Aid</i>	274
<i>Straw</i>	<u>148</u>
Total Returns	1,361

<b>Gross Margin</b>	<b>£916/ ha</b>
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\* Price paid by Flahavans

Previous Crop:	Winter Barley
Seeding Rate:	150 kg/ha (9.6st/ac)
Nitrogen:	125 kg/ha (100 units/ac)

Weed Control: Advance @ 1.5 l/ha + Sumialpha @ 0.17 l/ha (aphicide)

Treatments:

T1	8 / 3 / 99	CCC 750 @ 0.95 l/ha
	(GS 30)	+
		Li700 @ 0.56 l/ha
		+
		Alto @ 0.4 l/ha
T2	28 / 4 / 99	Alto @ 0.6 l/ha (3/4 rate)
	(GS 32/33)	+
		CCC 750 @1.7 l/ha
T3	24 / 5 / 99	Allegro @ 0.8 l/ha
	(GS 55)	

This crop had significantly lower material costs than the Winter Wheat, and with an average KPH of 57, Flahavans paid £93 / tonne. Added to this was the exceptional yield, thus giving the highest gross margin of the cereal crops. At GS 30 (ear at 1cm), the crop received a half-rate of Alto with the first split of Cycocel. This early fungicide treatment ensured this mildew prone variety remained clean from disease, making subsequent disease control easier. Splitting the growth regulator resulted in better shortening of the internodes as compared with other years when only a single application was used. This is the second year in succession that this approach was used and it has resulted in two record yielding years of oats.

## WINTER WHEAT

Average Yield:	9.3 t/ha	Variety:	Falstaff
Average Moisture:	17.0%	Sowing Date:	8/10/98

Costs:	<b><u>£ / ha</u></b>
Materials (seed, fertilisers, sprays)	315
Machinery	239
Miscellaneous	<u>45</u>
Total Variable Costs	599

Returns:

<i>Net Price (£80/t)</i>	744
<i>Area Aid</i>	274
<i>Straw</i>	<u>100</u>
Total Returns	1,118

**Gross Margin      £519/ha**

**SPRING BARLEY**

Average Yield:	7.8 t/ha	Varieties:	Crusader and Cooper
Average Moisture:	17.5%	Sowing Date:	19/03/99

Costs:	<b><u>£/ha</u></b>
<i>Materials (seed, fertilisers, sprays)</i>	183
<i>Machinery</i>	200
<i>Miscellaneous</i>	<u>30</u>
Total Variable Costs	413

Returns:

<i>Net Price (£77/t)</i>	601
<i>Area Aid</i>	274
<i>Straw</i>	<u>148</u>
Total Returns	1,023

**Gross Margin      £610/ha**

The performance of the Spring Barley in the college was very satisfactory. Having had problems with blotching the two previous years, 1999 saw a mainly blotch-free year. Consequently, the average yield of 7.8 t/ha was 11% higher than in 1998. The key husbandry factor involved in keeping blotch levels low was choice and timing of fungicide. At flag leaf stage, an 80% rate of Allegro proved to be an excellent choice of product. Allegro is a strobilurin fungicide, and it is this chemistry that displayed better control of blotching in Oakpark trials in 1998.

**Cereal Gross Margins (£/ha): 1998 vs 1999**

<b>Crop</b>	<b>1998</b>	<b>1999</b>	<b>% Change</b>
Winter Oats	680	916	+ 35%
Winter Wheat	368	519	+ 41%
Spring Barley	481	610	+ 27%

## **SUMMARY**

- Winter Oats proved to be the most profitable of the cereal crops, mainly due to a record yield, cheaper growing costs and higher grain price.
- Winter Wheat gross margin was 41% higher than in 1998, primarily due to savings on growing costs and higher yield.
- The Spring Barley showed very little signs of blotch resulting in a very high average yield, and a gross margin 27% higher than in 1998.
- Higher yields, grain price and straw price resulted in the 1999 cereal harvest in Kildalton being the most profitable since 1995.

## **CEREAL VARIETY TESTING**

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Crop Variety Testing Centre, Kildalton College***

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New varieties are submitted annually to the Department of Agriculture, Food and Rural Development from Irish agents acting on behalf of British, European and Irish plant breeding stations, for testing in statutory National List trials. Varieties must satisfy VCU and DUS standards over a two year period in these trials, before they can be included in the National Catalogue of Agricultural Plant Varieties. These trials are conducted at a minimum of five centres. Varieties that meet National Catalogue standards are advanced to Recommended List trials conducted at several centres. All trials are sown in drill strips 27 metres in length by 1.6 metres width in a randomised block design with 4 replications.

A limited number of varieties achieving exacting performance requirements over a minimum of 3 years testing attain the status of listing in the "Recommended List of Cereal Varieties". Varieties appearing on the list for the first time are Provisionally Recommended, and have completed a minimum of two years in Recommended List trials and one year in National List trials. The eventual status of these varieties is determined by level of performance in ongoing Recommended List trials; fully Recommended classification may be deemed to be merited after a further one, two or exceptionally three years, or alternatively they may be removed from the list at any stage. The list is updated annually and gives information on all the important characteristics of the varieties. Varieties are dropped from the list as they become outclassed by newer varieties.

**Winter Barley Recommended List Trial 2000**

	<b>Variety / Breeders Reference</b>	<b>Status</b>	<b>Agent</b>	<b>Yield * 00, 00, 98, 97</b>	<b>Notes</b>
1	Pastoral	R	P.S	99, 99, 101	
2	Regina	R	G.	101, 104, 106	
3	Vertige	R	G'C	100, 102, 110	
4	Antigua	PR	G'C	104, 82, 113	
5	Bombay	4 years in trial	G'C	102, 104, 104	
6	Heligan	2 years in trial	G'C	99	
7	Peridot	PR	S.T	100, 104, 114	
8	Opal	PR	S.T	103, 108, 111	
9	NSL 96/6306	1 year in trial	S.T	(106)	
10	NS 96/9111	1 year in trial	G'C	(105)	
11	Sumo	2 years in trial	S.T	104	
12	Cleopatra	2 years in trial	P.S	105, (104)	
13	Ladoga	2 years in trial	P.S	100, (102)	
14	Amadea	2 years in trial	P.S	99	
15	Siberia	1 year in trial	P.S	(113)	
16	Ludine	1 year in trial	P.S	(104)	
17	Avenue	1 year in trial	P.S		

*Yields in brackets are from National List Trials*

R = Recommended  
PS = Power Seeds  
ST = Seedtech

PR = Provisionally Recommended  
G = Germinal Seeds  
G'C = Goldcrop



**Spring Wheat Recommended / National List Trials 2000**

	<b>Variety / Breeders Reference</b>	<b>Status</b>	<b>Agent</b>	<b>Yield</b>	<b>Notes</b>
1	Alexandria	*R	G'C	98, 101, 98	
2	Baldus	R	P.S	102, 99, 102	
3	Raffles	PR	G'C	104, 111, 108	
4	Ashby	2 years in trial	G'C	102	
5	CPBTW71	1 year in trial	G'C		
6	LD91/59/1	1 year in trial	S.T		
7	NSLSW7	1 year in trial	S.T		
8	Triso	1 year in trial	S.T		
9	P92184/2	1 year in trial	P.S		
10	SE208/92	1 year in trial	P.S		
11	S191/95	3 years in trial	P.S	99, 101	
12	Wallace	1 year in trial	G'C		
13	CSW98201	1 year in trial	G'C		
14	Tecnico	1 year in trial	G'C		
15					
16					
17					
18					
19					
20					

\*R = Recommended List  
PR = Provisionally Recommended

G'C = Goldcrop  
P.S = Power Seeds  
S.T = Seed Technology

**Spring Barley Recommended List Trial 2000**

	<b>Variety / Breeders Reference</b>	<b>Status</b>	<b>Agent</b>	<b>Yield * 00, 99, 98, 97</b>	<b>Notes</b>
1	Cooper	R	S.T	100, 100, 99	
2	Crusader	R	G'C	100, 102, 108	
3	Optic	R	S.T	103, 103, 100	
4	Canasta	R	P.S	100, 100, 101	
5	Lamba	PR	P.S	100, 100, 103	
6	Fractal	PR	G'C	102, 101, 104	
7	Century	PR	S.T	104, 105, 103	
8	Newgrange	PR	S.T	105, 107, 102	
9	Saloon	3 years in trial	S.T	108, 108, (107)	
10	Lux	PR	P.S	108, 109, (109)	
11	Agenda	2 years in trial	P.S	107, (106)	
12	Annabell	2 years in trial	P.S	105, (111)	
13	Prestige	2 years in trial	G'C	103, -, (106)	
14	Hanka	2 years in trial	G'C	98, (106), (104)	
15	Tavern	2 years in trial	S.T	109, (106)	
16	Pewter	1 year in trial	S.T	(108), (107)	
17	GS 1846	1 year in trial	P.S	(106), (110)	
18	Adele	1 year in trial	G'C	(105)	
19	CM 2206	1 year in trial	G'C	(103)	
20	S 5957/X	1 year in trial	P.S	(104)	

*Yields in brackets are from National List Trials*

R = Recommended

PR = Provisionally Recommended

C = Control

G'C = Goldcrop

S.T = Seedtech

P.S = Power Seeds

**Winter Wheat Recommended List Trials 2000**

	<b>Variety / Breeders Reference</b>	<b>Status</b>	<b>Agent</b>	<b>Yield * 00, 99, 98, 97</b>	<b>Notes</b>
1	Brigadier	** R	P.S	102, 99, 96	
2	Rialto	R	G'C	96, 99, 102	
3	Madrigal	R	G'C	104, 102, 99	
4	Falstaff	PR	G'C	102, 105, 103	
5	Equinox	PR	G'C	105, 104, 98	
6	Biscay	1 year in trial	G'C	(108)	
7	Malacca	1 year in trial	G'C	(97)	
8	Oxbow	1 year in trial	G'C	(106)	
9	Marshal	PR	P.S	104, 106, (102)	
10	Savannah	2 year in trial	P.S	104, (99)	
11	Soissons	R	P.S	91, 93, 91	
12	Windsor	PR	P.S	103, 102, 103	
13	Tanker	1 year in trial	P.S	(109), (104)	
14	Milestone	1 year in trial	P.S	(103), (104)	
15	Reaper	R	S.T	102, 101, 103	
16	Buchan	PR	S.T	101, 102, (104)	
17	Claire	2 years in trial	S.T	103, (109), (102)	
18	Pulsar	1 year in trial	S.T	(105)	
19					
20					

\* Yields in brackets are from NLT  
 \*\* R = Recommended variety  
 PR = Provisionally Recommended

TL. YR. = Trial Year  
 AGT. = Agent  
 P.S. = Power Seeds  
 S.T = Seed Tech  
 G'C = Goldcrop

**Winter Oat Recommended / National List Trial 2000**

	<b>Variety / Breeders Reference</b>	<b>Status</b>	<b>Agent</b>	<b>Yield 00, 99, 98, 97</b>	<b>Notes</b>
1	Barra (S)	* R	G'C	93, 96, 97	
2	Kermit (S)	R	S.T	106, 106, 103	
3	Aberglen (S)	R	G'C	101, 99, 97	
4	Jalna	PR	G'C	100, 94, 103	
5	Millenium	2 years in trial	G'C	106, -, -	
6	Evita (S)	3 years in trial	S.T	106, 104, -	
7	Salomon	2 years in trial	P.S	69	
8	BL515/94 (S)	1 year in trial	P.S		
9	A97021	1 year in trial	P.S		
10	HA36/89/5 (S)	1 year in trial	GER		
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\* R = Recommended Variety  
PR = Provisionally Recommended Variety

G'C = Goldcrop  
S.T = Seed Tech  
P.S = Power Seeds  
GER = Germinal