



## *Husbandry Guidelines*



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# FIELDS *of* GOLD

## INTRODUCTION

Alchemy winter wheat was added to the HGCA Recommended List for 2006-7 in November 2005. The variety has shown extremely high yield over a number of years, and combines an excellent disease resistance profile with a range of end use markets. Alchemy has been subjected to rigorous Nickerson yield trials over a five year period and has been tested in National List and Recommended List trials for three years. There is a large quantity of data which confirms the very high yield potential of the variety as well as providing a robust disease database drawn from a range of environments.

The demise of strobilurin chemistry and reduced efficacy of key triazoles has placed an even greater emphasis on good genetic resistance as the basis for disease control strategies. The loss of a promising group of fungicides in the battle to control *Septoria spp* is unfortunate when grain prices are low. However, Alchemy's robust genetic resistance combined with the range of available fungicide products, both old and new, can reduce the threat of this very damaging disease and help maintain profitability.



Alchemy sets new standards in NABIM Group 4, just as varieties such as Xi19 (Group 1), Einstein (Group 2) and Claire (Group 3) have in their respective NABIM groups. Alchemy could be described as the first "quality feed wheat" - combining very high yield potential with excellent agronomic traits as well as providing growers with access to a range of end use markets.

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## ALCHEMY - ITS POSITION IN THE MARKET

The UK is climatically well placed to grow soft milling varieties - indeed it has acquired a well deserved reputation for consistency in this market. Since the advent of such outstanding varieties as Norman, Longbow and Brock, growers have embraced UK soft milling varieties. This move towards soft milling varieties is driven primarily by the increased marketing options available for this class of wheat - serving the domestic biscuit market, export markets and distilling, as well as the animal feed sector.



Table 1: Alveograph data for Alchemy compared to control varieties

	W Value	P/L Value	Protein (%)
<b>Alchemy</b>	<b>60</b>	<b>0.3</b>	<b>11.6</b>
Claire	100	0.3	11.7
Export Specification	<120	<0.55	10.5-11.5

Source: HGCA Recommended List 2006-7

Tests to date indicate that Alchemy will satisfy the needs of all these markets except the domestic biscuit market. However the improvement in agronomic type, combined with an excellent disease resistance profile will more than compensate for the loss of this small market opportunity.

Alveograph tests (for more information on the Alveograph and its significance see the Claire husbandry guidelines) indicate that the variety is likely to meet the specifications for the UKS soft milling brand - now the industry standard for export quality soft milling wheats.

Alchemy has also been added to the Scottish Agricultural Colleges (SAC) Recommended List for 2006. Following laboratory testing, Alchemy has been given a rating for distilling of 'Medium Good' - the best achievable prior to commercial evaluation. This market currently demands approximately

600,000 tonnes of wheat per year. Table 2 indicates the alcohol yields tests carried out by Nickerson in 2004. Alchemy shows high distilling potential as the variety does **not** possess the 1B/1R wheat/rye translocation, known to be disadvantageous in the distilling process.

Table 2: Nickerson UK distilling data

	Alcohol Yield Ltrs/Tonne	Percentage of Riband yield
<b>Alchemy</b>	<b>451</b>	<b>100.4</b>
Claire	453	100.9
Consort	446	99.3
Riband	449	100

Source: Nickerson "in house" distilling tests

Alchemy shows no weaknesses in its physical grain characters with good

specific weights and inherently high hagberg falling numbers.

Table 3: Alchemy grain characters

	Specific Weight	Hagberg Falling Number	Protein % Dry Matter
<b>Alchemy</b>	<b>77.3</b>	<b>248</b>	<b>11.6</b>
Claire	76.1	234	11.7
Consort	76.9	213	11.7

Source: HGCA Recommended List 2006-7

Claire and Consort have set new standards for biscuit wheat quality - surpassing historically acceptable varieties such as Riband. New soft wheats such as Alchemy, which has similar dough extensibility characters to Riband, are therefore unlikely to find a place in the domestic biscuit market. However the variety will fit the specifications for other soft milling domestic flours.



## ALCHEMY - PEDIGREE AND SELECTION MECHANISM

Pedigree: Alchemy = Claire x (Consort x Woodstock)

This cross was designed to enhance the disease profile of the soft milling group of wheats. There are often surprises in plant breeding and Alchemy supplies one. As individual varieties, Consort and Woodstock, which were crossed together, have only moderate disease resistance. However when combined with Claire the resistance of the selected line

(Alchemy) shows an improvement over all the parents used. This is the effect of multiple resistance genes working together.

Nickerson place a great deal of emphasis on disease resistance breeding and have established nurseries both in the UK and continental Europe.

## ALCHEMY - RESISTANCE TO DISEASES AND PESTS

Table 4 gives the current disease resistance ratings of Alchemy compared to established control varieties. It is clear from these ratings that Alchemy represents a significant advance. However, it is important to

use resistance factors with longevity. In general the disease resistance factors within Alchemy are based on the accumulation of minor genes which together have a major effect.

Table 4: Alchemy disease ratings

	Mildew	Yellow Rust	Brown Rust	<i>Septoria nodorum</i>	<i>Septoria tritici</i>	Eyespot
<b>Alchemy</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>(-)</b>	<b>7</b>	<b>6</b>
Claire	4	9	6	8	6	5
Consort	6	6	3	5	4	6
Malacca	7	9	7	7	5	4
Option	4	9	5	6	4	7
Robigus	(8)	3	9	8	7	5

(-) Indicates no rating available

Source: HGCA Recommended List 2006-7

It is well known that the *Septoria* resistance within Claire is polygenic (at least three genes) but the addition of unknown factors, probably from Woodstock, has enhanced this resistance profile in Alchemy, suggesting that there is an additive effect of combining minor genes. This is an import facet of the

Nickerson wheat programme as major genes (usually with complete resistance) are often vulnerable to race changes. A similar situation exists with resistance to both yellow rust (*Puccinia striiformis*) and brown rust (*Puccinia recondita*).



*Septoria* (seen here in Riband) can decimate yields. Alchemy has outstanding resistance to this disease

The resistance to mildew within Alchemy is from a new source - as yet unexploited in the UK. This resistance is not absolute - i.e. it does not confer immunity. However it has been utilised in a number of breeding lines over twenty years in the Nickerson programme and as yet no signs of resistance breakdown have been observed. This does however demonstrate the long term nature of wheat breeding.

Alchemy has good resistance to eyespot (HGCA rating = 6) based upon the resistance derived from Cappelle Desprez. It should be borne in mind that this resistance, whilst good, is not as potent as that found in varieties such as Hyperion, and under high risk situations such as early drilling or second / continuous wheats, additional fungicide protection should be considered routine.

## Resistance to Wheat Orange Blossom Midge

Wheat orange blossom midge (WOBM) has become a major pest over the last four years (2002-5 inclusive).

Differences in resistance have been identified in a range of varieties ([www.defra.gov.uk/science/default.htm](http://www.defra.gov.uk/science/default.htm)). Alchemy has been assessed for resistance under high pressure situations.

**Table 5: Alchemy tolerance to wheat orange blossom midge 2004**

	Mean number of midge larvae per ear		Mean
	Suffolk	Essex	
<b>Alchemy</b>	<b>2.4</b>	<b>13.7</b>	<b>8.0</b>
Claire	4.9	21.4	13.1
Consort	6.3	16.5	11.4
Malacca	9.9	32.3	21.1
Option	18.5	39.7	29.1
Tanker	7.7	27.6	17.6

Source: Nickerson trials

Table 5 gives comparative data for number of larvae found in different varieties in two trials in 2004. The Suffolk trial was affected by wheat orange blossom midge and the Essex site was very severely attacked by this pest. It is clear that Alchemy shows a significantly lower level of midge larvae than other varieties. Experience with Claire over a number of years indicates that the variety has some tolerance to this pest and Alchemy appears to be similar. This tolerance is not as pronounced as the resistance found in Brompton or Gatsby but still represents a major contribution to control compared to many varieties currently being grown commercially.

Only under high risk situations should applications of chlorpyrifos based products be considered. This is the only product with approval for the control of WOBM and is the only chemical with the necessary persistence to control hatching over a period of several days. Attempted control using pyrethroid based products may exacerbate the problem as these products may reduce the natural enemies of WOBM - hymenopterous parasitoids. Growers should seek advice from Dow Chemicals (e-mail [fhihotl@dow.com](mailto:fhihotl@dow.com) or freephone 0800 689 8899) regarding the use of their chlorpyrifos based products.

## ALCHEMY - YIELD POTENTIAL

Alchemy has been tested in Nickerson trials over a six year period (2000-2005). As such there is a robust database from which to ascertain the variety's yield potential. Table 6 gives the yield of Alchemy over this period. As in previous variety guidelines all data

is presented. It is quite clear that Alchemy does have an exceptionally high yield potential when treated with fungicide. The very high untreated yields are a reflection of the high disease resistance ratings.

**Table 6: Yield performance of Alchemy in Nickerson trials 2000-2005**

	Mean												Mean	Mean
	2000	2000	2001	2001	2002	2002	2003	2003	2004	2004	2005	2005	2000-2005	2000-2005
	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)
<b>No of Trials</b>	<b>1</b>	<b>1</b>	<b>6</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>7</b>	<b>1</b>	<b>28</b>	<b>12</b>
<b>Alchemy</b>	<b>110</b>	<b>132</b>	<b>105</b>	<b>108</b>	<b>112</b>	<b>125</b>	<b>109</b>	<b>120</b>	<b>121</b>	<b>130</b>	<b>108</b>	<b>110</b>	<b>111</b>	<b>121</b>
Deben	104	105	107	112	106	96	108	115	109	110	111	109	108	108
Claire	107	122	101	101	104	113	105	110	106	115	100	110	104	112
Consort	107	93	103	94	99	84	99	93	105	93	102	92	103	92
Malacca	102	98	98	103	93	100	95	99	93	100	93	98	96	100
Option	100	101	102	100	101	112	101	105	91	96	(-)	(-)	99	103
Tanker	104	94	102	100	104	87	99	93	105	96	102	103	103	96

(-) = not in trial

Yields expressed as the mean of the control varieties Claire, Consort, Malacca, Option, Tanker

These results are very much in line with data from trials carried out from 2003 National List / Recommended List trial to 2005 (table 7).

**Table 7: Alchemy yield performance National List/Recommended List Trials 2003-5**

	Treated	Untreated
<b>Alchemy</b>	<b>107</b>	<b>95</b>
Claire	100	81
Consort	99	74
Malacca	95	77
Option	101	83
Robigus	104	88

Yields expressed as the mean of the control varieties Claire, Consort, Malacca, Option, Tanker

Source: HGCA Recommended List 2006-7





## ALCHEMY - REGIONAL ADAPTATION

HGCA Recommended List trials test varieties under a wide range of environments. Alchemy has been recommended for all regions for its potential as a high yielding soft milling variety with a range of end use options.

The Scottish market is one to which Alchemy seems well suited, as it produces high yields of soft milling grain potentially suitable for the distilling market. Yield results from

Scottish grown trials are shown in table 8. It is clear that Alchemy performs well under a wide range of environmental conditions. None of these sites was drilled in early September - a popular sowing date in Scotland. It is anticipated that under an early drilling regime the superior disease resistance and good standing power of Alchemy would have significant benefits, leading to even better performance.

**Table 8: Alchemy - yields from Scottish grown sites 2005**

	First wheat sites				Second wheat sites		
	Aberdeen	Moray	Perth	Mean	East Lothian	Borders	Mean
<b>Alchemy</b>	<b>110</b>	<b>102</b>	<b>104</b>	<b>105</b>	<b>105</b>	<b>102</b>	<b>104</b>
Riband	95	108	99	101	97	102	100
Consort	101	96	101	99	100	96	98
Claire	94	94	96	95	94	98	96
Robigus	107	103	101	104	99	106	103
Deben	109	105	104	106	101	107	104
Istabraq	105	104	101	103	102	104	103

Yields expressed as mean of control varieties Claire, Consort, Option, Malacca, Tanker  
Source: HGCA Recommended List 2006-7

## ALCHEMY - ITS PLACE IN THE ROTATION

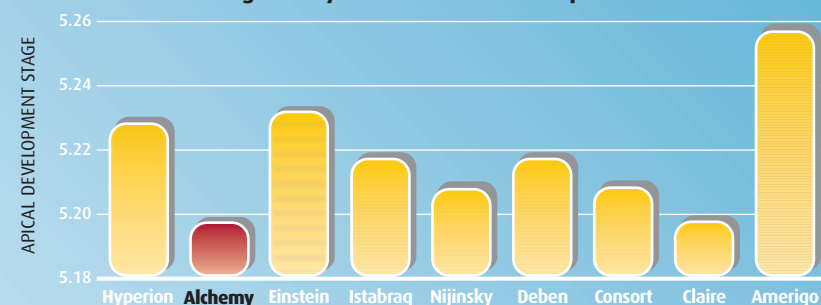
### Early Drilling

Alchemy has the attributes required for early drilling - namely

- Stiff straw
- Late primordia development
- Very good resistance to *Septoria spp*
- Prostrate winter habit
- Good eyespot resistance

Of these traits one of the most important is speed of development. Chart 1 shows a comparison of development in a range of varieties. Alchemy is similar to its parent Claire, a variety used regularly for early drilling.

**Chart 1: Nickerson Agronomy Ear Primordia Development**



Early drilling trials in 2005 confirmed Alchemy's speed of development and highlighted its suitability for early drilling. Trials conducted by the Association of Independent Crop Consultants ([www.aicc.org.uk](http://www.aicc.org.uk)) illustrate the value

of selecting the most appropriate variety for this difficult rotational position (table 9).

In this trial 18 varieties were sown early, (mid September). Alchemy was the highest yielding variety over the four sites.

**Table 9: Early drilled trials 2005**

	Suffolk (S)	Norfolk (N)	Sussex (Sx)	4 site mean S/N/Sx
<b>Drilling date</b>	<b>14/09/04</b>	<b>13/09/04</b>	<b>15/09/04</b>	
<b>Alchemy</b>	<b>110</b>	<b>104</b>	<b>108</b>	<b>107</b>
Claire	101	95	99	98
Einstein	103	99	100	101
Hereward	99	90	91	93

Yields expressed as percentage of all varieties in the trial (18)  
Source: AICC trials

## ALCHEMY - AGRONOMIC CHARACTERISTICS

### Late Drilling

It is unlikely that Alchemy will prove to be the best choice for later drilling. There are well established varieties which will fill this particular rotational need. Feed wheat Istabraq has produced excellent yields from this rotational position. If premiums are sought then there are a wide range of breadmaking varieties available including Xi19 and Einstein, as well as spring wheats.

### Second / Continuous Wheats

The current HGCA trial system is now very effective at identifying varieties with potential for the second / continuous wheat place in rotation. Part of the Nickerson breeding strategy is to expose varieties to evaluation in large scale 2nd wheat trials. The results from a two year series are given in table 10.

**Table 10: Alchemy yield performance in second wheat/continuous wheat situation**

	2003	2004	2005	Mean 2003-2005	HGCA RL
No of Trials	2	2	2	6	
<b>Alchemy</b>	<b>106</b>	<b>107</b>	<b>103</b>	<b>105</b>	<b>105</b>
Claire	99	103	103	102	98
Consort	99	103	100	101	99
Malacca	96	99	99	98	96
Option	104	98		101	100
Deben	105	109	108	107	103
Einstein	104	110	100	105	106
Istabraq	105	106	109	107	106

Yields expressed as the mean of controls Claire, Consort, Malacca, Option and Tanker

Varieties now well established as reliable second wheats were grown in the trial series for comparison. Compared to the control varieties Claire and Consort varieties such as Deben, Einstein and Istabraq are clearly identified as good performers. Alchemy has shown similar yield potential to these other varieties

but has a significant benefit in terms of disease resistance and standing power. As second wheats are likely to be sown later, growers should look carefully at the option of sowing Einstein in this situation as a potential quality premium could offset the yield decrease associated with growing second wheats.

Alchemy has straw length similar to Claire, with improved standing power. However, Plant Growth Regulators (PGRs) should be used on crops with a yield potential of greater than 8 tonnes per hectare. Applications should be made on early sown crops as routine, because early drilling will increase straw length. Note that Alchemy has a slow rate of development (see chart 1) and thus PGRs should be applied with this in mind. The best way to determine the developmental stage is by dissection but PGRs targeted at the stage when the first node is starting to move is acceptable for those unfamiliar with plant dissection techniques.

Nickerson experience has been that PGRs targeted at the glume primordia stage give the most effective response, shortening the critical first internode, and increasing straw stiffness. Crops should be treated routinely with a 2/3rd rate of a CCC based product at the glume primordia stage followed by a 1/3rd rate at first node (Zadoks 31). If weather conditions do not permit a split application then a full rate CCC + reduced rate Moddus (Syngenta) application should be applied at Zadoks GS31. Growers should also consider the use of Meteor (BASF) in combination with CCC at the glume primordia stage. Trace elements can also be included at this stage as this will benefit nitrogen uptake and improve the response to PGRs.

**Table 11: Recommended seed rates for Alchemy winter wheat**

Time of Sowing	Seed Rate (Ideal Conditions)	Seed Rate (Adverse Conditions)
Sept 1st - Sept 15th	120-160	160-250
Sept 16th - Sept 25th	160-200	200-280
Sept 26th - Oct 5th	220-275	275-325
Oct 6th - Oct 31st	265-325	325-375
Nov 1st - Nov 30th	300-350	350-425
Dec 1st - Feb 14th	325-375	375-450

Alchemy has a prostrate winter habit, and will tiller well during the winter and early spring, and seed rates should be adjusted to take this into account.

Table 11 shows advised seed rates but these will need to be modified according to the region in the UK where the crop is being grown.

## ALCHEMY - SEED TREATMENTS

In first wheat situations a single purpose treatment should be applied as routine as even healthy looking grains can harbour disease in high-risk years. For early sown crops the application of a broad spectrum seed dressing should be considered. This type of dressing is likely to improve early vigour, enhance disease protection and improve standing power. There are a wide range of seed treatments available and growers should seek advice as to the most appropriate product for their situation.

In second wheat or continuous wheat situations or where take-all is likely to present a problem, products such as Jockey (BASF) or Latitude ([www.monsanto-ag.co.uk/layout/latitude/](http://www.monsanto-ag.co.uk/layout/latitude/)) should be considered. However, take-all is a sporadic problem and these treatments should be reserved for high to very high risk situations.

## ALCHEMY - RESPONSE TO FUNGICIDE

Nickerson carry out a range of agronomy trials on varieties from the company's wheat programmes. In the case of Alchemy, two years trials have now been completed and these are reported here. Harvest 2004 was a first wheat site with the main disease threat

In early sown situations, particularly in the South and South West, Barley Yellow Dwarf Virus (BYDV) treatments such as Secur or Redigo Deter ([www.bayercropscience.com](http://www.bayercropscience.com)) should be considered. This treatment alone is unlikely to remove the need for additional insecticide sprays but will considerably reduce the risk of heavy BYDV attack.

Early sown crops are at risk from increased levels of foliar and root diseases and whilst reduced seed rates may help to alleviate these problems some of the financial savings should be re-invested in better quality seed and improved seed dressings. Products such as Multimax will be particularly valuable in difficult or poor soils.

### Herbicide tolerance

Preliminary tests suggest that Alchemy is tolerant of herbicides based on chlortoluron ([www.mauk.co.uk](http://www.mauk.co.uk)).

*Septoria tritici*. For 2005, a second wheat site was selected and the main disease threats were brown rust and eyespot.

Fungicide treatments for harvest 2004 are given in table 12.

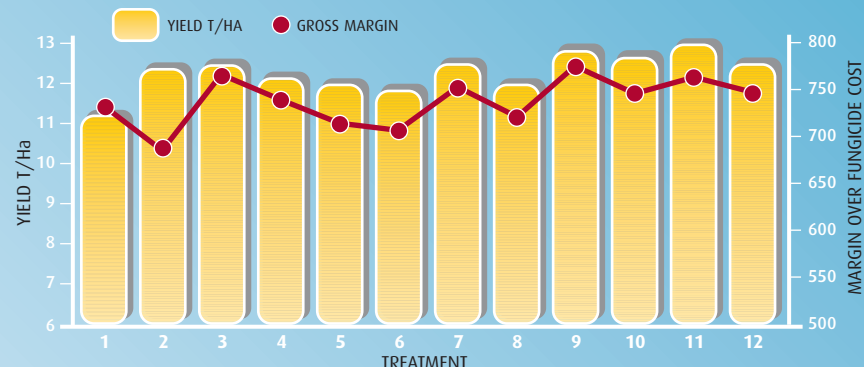
Table 12: Nickerson fungicide trials 2004

CODE	T1 CHEMICAL	GS 32 L/ha	T2 CHEMICAL	GS 39/45 L/ha	T3 CHEMICAL	GS 39/45 L/ha	PROGRAMME COST FUNG £/ha
1	UNTREATED		UNTREATED		UNTREATED		
2	UNIX OPUS BRAVO	1.0 kg/ha 0.75 1	OPERA BRAVO OPUS	1.5 1 0.2	AMISTAR FOLICUR	0.6 0.5	115.06
3	OPUS BRAVO	0.5 1	OPUS	0.75	FOLICUR	0.5	39.80
4	LANDMARK BRAVO	0.5 1	LANDMARK	0.75	FOLICUR	0.5	51.30
5	OPUS BRAVO	0.5 1	TWIST OPUS	0.8 0.75	FOLICUR TWIST	0.5 0.5	59.30
6	TWIST OPUS BRAVO	0.8 0.5 1	TWIST OPUS	0.8 0.75	FOLICUR	0.5	63.80
7	OPUS	0.5	AMISTAR OPTI OPUS	1 0.5	AMISTAR CARAMBA	0.3 0.5	51.70
8	OPUS BRAVO	0.5 1	AMISTAR OPTI OPUS	1 0.5	AMISTAR CARAMBA	0.3 0.5	55.00
9	OPUS BRAVO	0.5 1	AMISTAR OPTI OPUS	1 0.5	AMISTAR CARAMBA BRAVO	0.3 0.5 1	58.30
10	OPUS BRAVO	0.5 1	OPERA OPUS	1 0.45	SWING GOLD	0.75	68.34
11	TRACKER BRAVO	1 1	OPERA OPUS	1 0.45	SWING GOLD	0.75	79.94
12	OPUS BRAVO	0.5 1	AMISTAR OPUS BRAVO	0.5 0.4 1	AMISTAR FOLICUR	0.5 0.5	60.62

Costings derived from mean of 6 sources



Chart 2: Nickerson Agronomy H04 Variety Fungicide Trial - Alchemy



Yields and gross margins from these treatments are provided in chart 2

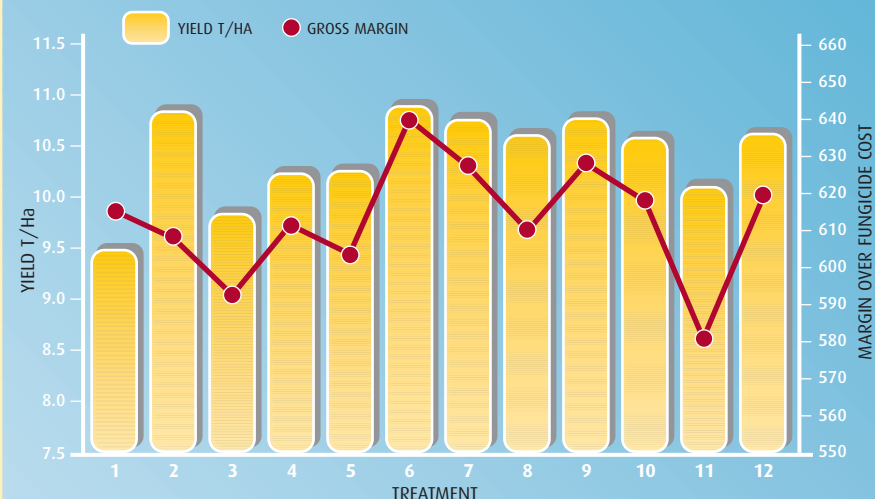
Fungicide treatments and costings for harvest 2005 are given in table 13 and yields and gross margins provided in chart 3

Table 13: Variety fungicide trial H05

CODE	T1 CHEMICAL	GS 32 L/ha	T2 CHEMICAL	GS 39/45 L/ha	T3 CHEMICAL	GS 39/45 L/ha	TOTAL SPRAY COST £/ha
1	UNTREATED		UNTREATED		UNTREATED		
2	PROLINE BRAVO	0.6 1	OPERA BRAVO OPUS	1.5 1 0.2	AMISTAR FOLICUR	0.6 0.5	99.00
3	OPUS BRAVO	0.5 1	OPUS BRAVO	0.75 1	FOLICUR BRAVO	0.5 1	47.00
4	OPUS BRAVO	0.5 1	OPUS BRAVO	0.75 1	SWING GOLD	0.75	52.00
5	TRACKER	1	TRACKER	1.5	SWING GOLD	0.75	69.00
6	TRACKER	1	OPERA OPUS	0.75 0.45	SWING GOLD	0.75	69.00
7	PROLINE BRAVO	0.4 1	TWIST PROSARO BRAVO	1 0.75 1	FANDANGO	0.66	76.00
8	PROLINE BRAVO	0.6 1	TWIST PROSARO BRAVO	1 0.75 1	FANDANGO	0.66	84.00
9	FANDANGO BRAVO	1 1	TWIST PROSARO BRAVO	1 0.75 1	FOLICUR	0.5	78.00
10	ALTO XTRA BRAVO	0.4 1	AMISTAR OPTI OPUS	1.25 0.75	AMISTAR PROLINE	0.5 0.3	72.00
11	ALTO XTRA BRAVO	0.4 1	AMISTAR OPTI OPUS	1.25 0.75	AMISTAR PROLINE	0.75 0.3	78.00
12	OPUS BRAVO	0.5 1	AMISTAR OPTI OPUS	1.25 0.75	AMISTAR PROLINE	0.5 0.3	72.00

Costings derived from mean of 6 sources

Chart 3: Yields and Gross Margins from Nickerson Agronomy Trial H05 - Alchemy



Of particular note are treatments 1 and 2 in both years. Treatment 1 involves no fungicide applications - completely untreated. In contrast treatment 2 is the HGCA Recommended List fungicide protocol. This programme has been designed to reduce any disease threat and this explains the high cost incurred. However this protocol is designed to measure the yield potential of the varieties under test, so the other treatments can be used to see how much of this yield potential has been captured.

In 2004, Treatment 1 was interesting as with no fungicides applied at all, the yield of the crop was 11 tonnes per hectare. This contrasts with the second wheat harvest of 2005 when yields were reduced by infections of brown rust and eyespot.

In 2004 the highest yield was obtained using treatment 11 - an expensive programme based on Tracker (BASF) and utilising a high component of strobilurin chemistry. Although yielding 13 tonnes per hectare the gross margin was inferior to treatment 9 - a cheaper programme based on a lower cost strobilurin at T2. In general though there is strong evidence to support the use of strobilurin chemistry - despite its loss of efficacy for key diseases such as mildew and *Septoria tritici*.

Treatment 3 was the cheapest programme and gave yields similar to the full HGCA programme. It also produced an attractive gross margin. This treatment involved the use of no strobilurin chemistry but well tested and proven triazoles.

Of interest throughout the trial was the value that was derived from the inclusion of chlorthalonil (Bravo) as a routine application. This may seem surprising for a variety with such a robust rating for *Septoria tritici* (7). However, disease management is about managing the interaction between genetic resistance and chemical control. The resistance of Alchemy to *Septoria tritici* is very good but the variety is not totally immune. It is apparent that the high levels of resistance are complemented by the use of chlorthalonil based products. The relationship between genetic resistance and chemical control is important as there is an opportunity to protect both mechanisms using this synergy.

In the 2005 trials, on a second wheat site, the highest yields were obtained with the HGCA fungicide programme (treatment 2) but this was matched by treatments 6 and 9. Treatment 6 utilised Tracker at T1 whilst treatment 9 used Proline and Bravo. Both results give credence to the claims of their respective manufacturers (BASF, Bayer) for control of root diseases - primarily eyespot. Other treatments of interest include no.3, a basic triazole programme, which produced a low yield and low gross margin. This is likely to be a reflection of lack of eyespot control and possibly less effective control of late developing brown rust. This is in contrast to 2004 where these diseases were not present. Treatment 11 produced a moderate yield and low gross margin - a consequence of high fungicide costs.

### Fungicide Summary

With low grain prices, farmers will be looking to source new varieties with good all round disease resistance. Alchemy provides a good level of resistance to the main diseases of wheat. However this resistance must be complemented by complementary use of fungicides. Strobilurin chemistry is no longer effective for the control of either mildew or *Septoria spp* and thus the use of this group of chemicals has to be based on the control of other foliar pathogens, or for their property of enhancing green leaf area duration.

The use of triazole chemistry with chlorthalonil produced the best gross margins in 2004 and is an option when disease pressure is low - e.g. first wheats sown in October. However crops sown early will be at risk from higher disease levels than those sown later and this chemistry alone is unlikely to be sufficient to protect the crop from damage. In these situations growers should look to the utilisation of new products which incorporate both foliar and root disease control.

None of the treatments involved the use of a T0 spray. Whilst this approach to disease control may be justified on varieties with weak disease resistance profiles, it is unlikely to be cost effective on Alchemy.

T3 applications should be made as routine as this slightly later maturing variety will benefit from extended green leaf area duration. Whilst much is made of the value of fungicides in protecting or enhancing yield, this late application of fungicide is valuable in maintaining grain quality. The maritime climate of the UK lends itself to ear diseases such as *Fusarium* and whilst these may be sporadic in nature all varieties are vulnerable. Whilst Alchemy has a high level of resistance (Nickerson provisional rating 7) this should be complemented by the use of fungicide control. Swing Gold (BASF) and a combination of Amistar (Syngenta) and Folicur (Bayer) have been proven to be effective in controlling ear diseases.



Left unchecked, severe *Fusarium* infections can reduce yield, affect quality and contaminate grain with mycotoxins

The full HGCA Recommended List Database can be consulted at [www.hgca.com](http://www.hgca.com)