Winter wheat 2021/22

Market options, yield and grain quality

	KWS Zyatt	Skyfall	Crusoe	RGT Illustrious	KWS Extase	KWS Siskin	LG Detroit	LG Prince	LG Illuminate	LG Quasar	KWS Firefly	Merit	LG Astronomer	KWS Barrel	Elicit	LG Skyscraper	RGT Saki	LG Spotlight	Elation	Swallow	KWS Jackal	LG Sundance	SY Insitor	KWS Cranium	KWS Kinetic	Gleam	RGT Gravity	KWS Kerrin	Graham	RGT Wolverine	Shabras	Costello	Theodore	Average LSD (5%)
End-use group	UKFM Group 1				UKFM Group 2			UKFM Group 3								Soft Group 4							Hard Group 4											
Scope of recommendation	UK	UK	UK	UK	UK	UK	E&W	UK	UK	UK	UK	E	UK	UK	UK	UK	UK	UK	N	N	N	UK	UK	UK	UK	UK	UK	E&W	UK	UK	Sp	UK	W	
		C			C		*	NEW	NEW	NEW		NEW	NEW	C				C	NEW			*		NEW	C			NEW		NEW		*		
Fungicide-treated grain yield (% treated control)																																		
United Kingdom (10.8 t/ha)	98	97	96	96	100	100	99	103	102	102	101	101	101	100	99	105	104	103	101	100	100	100	104	104	103	103	103	102	102	102	101	99	99	2.2
East region (10.7 t/ha)	98	97	96	95	100	99	99	104	102	102	102	103	102	100	99	105	104	102	101	100	100	99	104	104	103	103	103	102	101	101	101	99	99	2.5
West region (10.9 t/ha)	99	97	97	97	101	100	99	102	101	101	101	99	100	100	99	104	104	104	101	100	100	100	104	104	105	103	103	102	105	101	101	100	102	2.9
North region (11.0 t/ha)	97	96	93	94	98	98	93	[100]	[102]	[101]	98	[100]	[98]	103	100	103	102	101	101	[102]	101	99	105	[102]	100	102	101	102	101	[103]	102	99	[[90]]	3.4
Main market options (The specific attributes of varieties are different, so, whenever possible, varieties should not be mixed in store)																																		
UK bread-making	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
UK biscuit, cake-making	-	-	-	-	-	-	-	Y	Y	Y	Y	Y	Y	Y	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
UK distilling	-	-	-	-	-	-	-	[Y]	[Y]	[Y]	-	[Y]	[Y]	-	Y	[Y]	-	[Y]	Y	Y	[Y]	[Y]	-	-	-	-	-	-	-	-	-	-	-	
ukp bread wheat for export	Y	-	Y	-	Y	Y	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
uks soft wheat for export	-	-	-	-	-	-	-	-	[Y]	[Y]	Y	[Y]	-	Y	Y	-	-	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Grain quality																																		
Endosperm texture	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Soft	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	
Protein content (%)	12.4	12.5	13.0	12.4	12.1	12.0	12.5	11.3	12.0	11.6	12.0	11.7	11.9	11.4	11.8	11.6	11.6	11.5	11.8	11.3	11.3	11.5	11.0	11.3	11.5	11.5	11.5	10.9	11.5	11.2	11.5	12.1	12.2	0.2
Protein content (%) - Milling spec	13.1	13.2	13.6	13.0	12.7	12.7	13.1	[11.3]	[12.4]	[12.0]	12.5	[12.1]	[12.4]	12.0	12.4	12.2	12.0	12.1	12.4	[11.9]	12.0	12.1	11.4	[11.4]	12.1	12.0	12.0	11.4	11.9	[11.8]	12.1	12.7	12.8	0.4
Hagberg Falling Number	267	279	274	277	299	289	283	250	251	212	243	255	238	234	213	214	227	288	210	245	185	178	273	277	267	217	199	148	279	274	211	326	313	27.2
Specific weight (kg/hl)	77.8	78.4	77.9	77.2	78.4	76.9	77.6	74.8	76.6	75.4	75.6	76.5	77.8	77.2	76.8	76.8	75.9	78.0	77.2	76.3	75.5	73.8	78.4	75.4	78.5	76.3	75.9	76.2	76.8	75.9	76.0	80.8	74.3	0.7
Chopin Alveograph W	177	-	220	-	191	162	218	[74]	84	87	91	87	[134]	101	90	-	-	[73]	95	-	[76]	[101]	-	-	-	-	-	-	-	[143]	-	-	-	21.5
Chopin Alveograph P/L	0.7	-	0.6	-	0.6	0.5	0.7	[0.3]	0.3	0.3	0.3	0.2	[0.4]	0.4	0.3	-	-	[0.4]	0.3	-	[0.3]	[0.3]	-	-	-	-	-	-	-	[0.7]	-	-	-	0.1

Varieties no longer listed: Bennington, Dunston, KWS Basset, KWS Crispin, KWS Lili, Leeds, LG Motown, Revelation, Viscount and Zulu.
Comparisons of varieties across regions are not valid.
All yields in this table are taken from treated trials receiving a full fungicide and PGR programme.

UKFM = UK Flour Millers
UK = Recommended for the UK
E = Recommended for the East region
W = Recommended for the West region
N = Recommended for the North region

Sp = Specific recommendation. RGT Wolverine has a specific recommendation for resistance to *Barley yellow dwarf virus* (BYDV). Resistance to BYDV has not been verified in Recommended List tests
* = Variety no longer under test in RL trials
[ ] = Limited data
[[ ]] = Very limited data
PGR = Plant growth regulator

C = Yield control (for current table)
* = Variety no longer under test in RL trials
[ ] = Limited data
[[ ]] = Very limited data

Y = Suited to that market
[Y] = May be suited to that market

LSD = Least significant difference
Average LSD (5%): Varieties that are more than one LSD apart are significantly different at the 95% confidence level

Winter wheat 2021/22

Yield, agronomy and disease resistance

AHDB RECOMMENDED

	KWS Zyatt	Skyfall	Crusoe	RGT Illustrious	KWS Extase	KWS Siskin	LG Detroit	LG Prince	LG Illuminate	LG Quasar	KWS Firefly	Merit	LG Astronomer	KWS Barrel	Elicit	LG Skyscraper	RGT Saki	LG Spotlight	Elation	Swallow	KWS Jackal	LG Sundance	SY Insitor	KWS Cranium	KWS Kinetic	Gleam	RGT Gravity	KWS Kerrin	Graham	RGT Wolverine	Shabras	Costello	Theodore	Average LSD (5%)
End-use group	UKFM Group 1				UKFM Group 2			UKFM Group 3								Soft Group 4							Hard Group 4											
Scope of recommendation	UK	UK	UK	UK	UK	UK	E&W	UK	UK	UK	UK	E	UK	UK	UK	UK	UK	UK	N	N	N	UK	UK	UK	UK	UK	UK	E&W	UK	Sp	UK	UK	W	
			C			C	*	NEW	NEW	NEW			NEW	NEW	C			C	NEW			*		NEW		C				NEW	*			
Fungicide-treated grain yield (% treated control)																																		
United Kingdom (10.8 t/ha)	98	97	96	96	100	100	99	103	102	102	101	101	101	100	99	105	104	103	101	100	100	100	104	104	103	103	103	102	102	102	101	99	99	2.2
East region (10.7 t/ha)	98	97	96	95	100	99	99	104	102	102	102	103	102	100	99	105	104	102	101	100	100	99	104	104	103	103	103	102	101	101	99	99	99	2.5
West region (10.9 t/ha)	99	97	97	97	101	100	99	102	101	101	101	99	100	100	99	104	104	104	101	100	100	100	104	104	105	103	103	102	105	102	101	100	102	2.9
North region (11.0 t/ha)	97	96	93	94	98	98	93	[100]	[102]	[101]	98	[100]	[98]	103	100	103	102	101	101	[102]	101	99	105	[102]	100	102	101	102	101	[103]	102	99	[[90]]	3.4
Untreated grain yield (% treated control)																																		
United Kingdom (10.8 t/ha)	79	74	69	80	93	80	75	83	85	82	80	80	86	71	78	81	85	78	75	79	73	83	78	78	74	81	77	74	87	72	77	80	88	5.7
Agronomic features																																		
Resistance to lodging without PGR (1–9)	7	8	7	7	7	6	8	[7]	[7]	[7]	8	[7]	[7]	7	7	7	7	7	7	[8]	7	6	6	[8]	7	7	7	7	7	[7]	7	7	7	0.8
Resistance to lodging with PGR (1–9)	8	8	8	8	8	8	8	8	8	8	8	7	8	8	8	7	7	8	8	9	7	7	7	8	8	7	7	8	8	7	7	8	8	0.6
Height without PGR (cm)	84	83	81	89	90	84	86	83	82	89	83	88	88	84	85	92	88	93	82	79	87	87	95	88	84	87	88	86	88	86	82	83	83	1.9
Ripening (days +/- Skyfall, -ve = earlier)	0	0	0	+1	-1	0	+1	+2	+1	+2	+1	+1	+1	+1	0	0	+3	+1	+1	0	+1	+2	+1	+2	0	0	+1	+1	-1	+2	0	+2	0	0.7
Resistance to sprouting (1–9)	5	5	6	6	[7]	5	[6]	[6]	[7]	[6]	[6]	[6]	[6]	6	[5]	[5]	[6]	[7]	[6]	[5]	[5]	4	[5]	[6]	[6]	[5]	[4]	6	6	[6]	4	7	[7]	1.0
Disease resistance																																		
Mildew (1–9)	7	6	6	7	7	7	6	4	5	6	5	3	4	6	6	7	5	6	7	5	7	7	6	5	5	6	4	7	7	5	6	8	[7]	1.3
Yellow rust (1–9) **- see note below**	5	3	9	8	8	9	8	8	7	6	8	7	9	7	8	8	8	6	8	6	9	9	5	8	4	5	7	4	8	5	9	9	9	0.9
Brown rust (1–9) **- see note below**	6	8	3	6	7	5	5	8	8	8	5	8	9	5	6	6	7	6	5	6	5	5	5	5	6	6	6	7	5	8	5	5	7	1.0
Septoria tritici (1–9)	6.4	5.8	6.3	6.0	8.0	6.5	5.4	7.1	7.0	6.6	6.8	6.6	7.4	4.2	5.1	5.1	6.5	5.2	4.1	5.7	4.8	7.9	6.8	6.0	5.3	6.1	4.9	4.8	6.8	5.3	6.1	6.0	8.3	1.1
Eyespot (1–9)	7@	6@	5	6@	[4]	5	[5]	[5]	[5]	[4]	[4]	[4]	[5]	4	4	[4]	[5]	[5]	4	[3]	4	3	[5]	[5]	[5]	4	4	5	3	[5]	4	5	[5]	1.7
Fusarium ear blight (1–9)	6	7	6	6	6	5	7	6	5	6	5	6	6	6	6	7	6	6	6	5	6	6	7	6	6	6	6	6	7	6	6	7	6	0.5
Orange wheat blossom midge	-	R	-	-	-	-	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	-	-	-	-	-	

On the 1–9 scales, high figures indicate that a variety shows the character to a high degree (e.g. high resistance).
Comparisons of varieties across regions are not valid.

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N = Recommended for the North region

Sp = Specific recommendation. RGT Wolverine has a specific recommendation for resistance to *Barley yellow dwarf virus* (BYDV). Resistance to BYDV has not been verified in Recommended List tests
PGR = Plant growth regulator

C = Yield control (for current table)
* = Variety no longer under test in RL trials
[ ] = Limited data
[[ ]] = Very limited data

@ = Believed to carry the *Pch1* Rendezvous resistance gene to eyespot, but this has not been verified in Recommended List tests
R = Believed to be resistant to orange wheat blossom midge (OWBM), but this has not been verified in Recommended List tests

LSD = Least significant difference
Average LSD (5%): Varieties that are more than one LSD apart are significantly different at the 95% confidence level

AHDB Recommended List

Winter wheat 2021/22

Supplementary data

AHDB RECOMMENDED

	KWS Zyatt	Skyfall	Crusoe	RGT Illustrious	KWS Extase	KWS Siskin	LG Detroit	LG Prince	LG Illuminate	LG Quasar	KWS Firefly	Merit	LG Astronomer	KWS Barrel	Elicit	LG Skyscraper	RGT Saki	LG Spotlight	Elation	Swallow	KWS Jackal	LG Sundance	SY Insitor	KWS Cranium	KWS Kinetic	Gleam	RGT Gravity	KWS Kerrin	Graham	RGT Wolverine	Shabras	Costello	Theodore	Average LSD (5%)
End-use group	UKFM Group 1				UKFM Group 2			UKFM Group 3								Soft Group 4							Hard Group 4											
Scope of recommendation	UK	UK	UK	UK	UK	UK	E&W	UK	UK	UK	UK	E	UK	UK	UK	UK	UK	UK	N	N	N	UK	UK	UK	UK	UK	UK	E&W	UK	Sp	UK	UK	W	
			C			C	*	NEW	NEW	NEW			NEW	C				C		NEW		*		NEW	C					NEW				
Breeder/UK contact																																		
Breeder	KWS	RAGT	Lim	R2n	Mom	KWS	LimEur	LimEur	LimEur	LimEur	KWS	ElsW	LimEur	KWS	ElsW	LimEur	RAGT	LimEur	ElsW	BA	KWS	LimEur	SyP	KWS	KWS	SyP	R2n	KWS	SyP	R2n	SyP	KWS	DSV	
UK contact	KWS	RAGT	Lim	RAGT	KWS	KWS	Lim	Lim	Lim	Lim	KWS	Els	Lim	KWS	Els	Lim	RAGT	Lim	Els	Sen	KWS	Lim	Syn	KWS	KWS	Syn	RAGT	KWS	Syn	RAGT	Syn	Sen	DSV	
Annual treated yield (%control)																																		
2016 (11.0 t/ha)	98	96	95	92	99	99	99	-	-	-	100	-	-	101	102	108	-	104	101	-	102	102	-	-	-	103	106	102	102	-	100	101	-	2.2
2017 (11.1 t/ha)	101	98	96	97	99	99	99	-	-	-	102	-	-	101	98	105	104	104	101	-	101	98	104	-	105	102	103	101	101	-	100	101	99	2.4
2018 (10.5 t/ha)	98	98	96	97	101	101	98	102	102	101	101	102	101	99	98	102	102	99	100	100	100	101	103	104	102	103	100	103	100	101	101	100	99	2.2
2019 (11.5 t/ha)	96	96	95	95	101	100	101	103	102	101	102	101	102	101	99	104	104	102	100	100	100	99	106	102	104	102	103	102	103	102	99	101	101	2.3
2020 (10.0 t/ha)	97	96	94	97	99	97	96	103	102	103	100	101	100	102	98	103	105	103	102	102	101	99	103	105	101	103	103	102	102	102	101	100	[97]	2.7
Rotational position																																		
First cereal (11.1 t/ha)	98	97	96	95	100	100	98	102	102	102	101	101	101	101	99	104	104	103	100	101	101	100	104	104	103	103	102	102	102	102	100	99	-	2.2
Second and more (9.5 t/ha)	99	97	95	95	101	98	99	104	102	100	101	102	100	100	100	104	104	101	102	100	101	100	103	103	102	103	104	103	101	101	102	98	[99]	3.8
Sowing date (most trials were sown in October)																																		
Early sown (before 25 Sept) (11.0 t/ha)	[102]	97	95	98	-	101	-	[106]	[109]	-	103	-	[105]	99	100	[[103]]	[108]	101	101	[105]	102	97	-	-	99	103	100	[102]	100	-	[104]	98	97	6.8
Late sown (after 1 Nov) (9.5 t/ha)	97	97	95	95	101	99	98	[106]	[103]	[103]	101	[105]	[101]	101	97	103	[105]	101	101	[100]	101	98	[104]	[108]	[103]	103	104	103	99	[101]	98	100	[[99]]	3.7
Soil type (about 50% of trials are on medium soils)																																		
Light soils (10.8 t/ha)	97	97	94	93	101	98	97	[103]	[102]	[101]	101	[101]	[99]	101	99	104	103	101	102	[101]	100	99	107	[105]	104	102	103	103	102	[99]	101	98	[[99]]	3.7
Heavy soils (10.9 t/ha)	99	97	97	96	100	100	101	103	103	102	103	103	103	100	99	105	103	103	100	100	100	99	104	103	105	103	102	101	102	102	101	99	101	2.9
Agronomic features																																		
Lodging % without PGR	4	2	3	4	4	21	2	4	3	7	2	11	3	3	6	9	11	5	5	0	6	13	14	1	5	5	6	8	7	4	10	3	8	
Lodging % with PGR	1	2	2	1	1	7	3	4	4	3	1	4	1	2	3	10	4	2	2	0	9	12	4	3	3	4	7	9	2	3	11	1	2	
Latest safe-sowing date #	End Jan	End Feb	End Jan	Mid Feb	End Jan	End Jan	End Jan	[[End Jan]]	[[Mid Feb]]	[[End Feb]]	End Feb	[[Mid Feb]]	[[Mid Feb]]	End Jan	Mid Feb	End Jan	[End Jan]	End Feb	Mid Feb	[[End Feb]]	End Jan	End Jan	[End Jan]	[[Mid Feb]]	[End Jan]	Mid Feb	End Jan	End Jan	End Jan	[[End Jan]]	Mid Feb	End Jan	End Jan	
Speed of development to growth stage 31 (days +/- average)																																		
Early sown (Sept)	-2	-2	+1	0	-3	-7	+6	-	-	-	-2	-	-	+5	-2	-5	[+8]	-4	0	-	+5	+9	[0]	-	[-2]	+7	+5	0	+3	-	+2	-2	[-1]	10.9
Med sown (Oct)	-4	-3	0	+2	-6	-5	+2	-	-	-	-3	-	-	-2	+2	0	[+1]	-3	-1	-	+3	+3	[+1]	-	[+5]	+7	+2	+2	0	-	0	-1	[-3]	9.8
Late sown (Nov)	-2	-2	0	0	-3	-2	+1	-	-	-	0	-	-	+2	+2	-4	[0]	-1	-1	-	+1	+3	[+2]	-	[-2]	+3	-2	0	-3	-	0	-2	[-1]	5.5
Status in RL system																																		
Year first listed	17	14	12	16	19	16	19	21	21	21	19	21	21	16	18	19	20	19	18	21	18	17	20	21	20	18	18	17	16	21	17	15	20	
RL status	-	-	-	-	-	-	*	P1	P1	P1	-	P1	P1	-	-	-	P2	-	-	P1	-	*	P2	P1	P2	-	-	-	-	P1	*	-	P2	

All yields in this table are taken from treated trials receiving a full fungicide and PGR programme.

UKFM = UK Flour Millers
UK = Recommended for the UK
E = Recommended for the East region
W = Recommended for the West region
N = Recommended for the North region
Sp = Specific recommendation. RGT Wolverine has a specific recommendation for resistance to Barley yellow dwarf virus (BYDV). Resistance to BYDV has not been verified in Recommended List tests

C = Yield control (for current table)
* = Variety no longer under test in RL trials
PGR = Plant growth regulator
[ ] = Limited data
[[ ]] = Very limited data
# = Latest safe-sowing date is the advised latest sowing time to give a sufficient cold period for flowering
P1 = First year of recommendation
P2 = Second year of recommendation

BA = Blackman Agriculture
DSV = DSV UK (**dsv-uk.co.uk**)
Els = Elsoms Seeds (**elsoms.com**)
ElsW = Elsoms Wheat Ltd (**elsoms.com**)
KWS = KWS UK (**kws-uk.com**)
Lim = Limagrain UK (**lgseeds.co.uk**)

LimEur = Limagrain Europe SA (**lgseeds.co.uk**)
Mom = Momont, France (**kws-uk.com**)
R2n = RAGT, France (**ragt.co.uk**)
RAGT = RAGT Seeds (**ragt.co.uk**)
Sen = Senova (**senova.uk.com**)
SyP = Syngenta Participations AG (**syngenta.co.uk**)
Syn = Syngenta UK Ltd (**syngenta.co.uk**)

LSD = Least significant difference
Average LSD (5%): Varieties that are more than one LSD apart are significantly different at the 95% confidence level

Winter wheat rust ratings for 2021/22

The RL 2021/22 sees major changes to the disease-rating-calculation approach for winter wheat yellow and brown rust. This section describes the main developments, including how they affect the headline ratings.

Winter wheat rust ratings

Typically, cereal disease ratings are based on the average level of disease in trials, observed over a three-year period. In the last few years, rust ratings have failed to reflect in-season field observations for some varieties at some locations. This is partly due to the increasingly diverse and dynamic nature of the UK's rust populations and the rating-calculation method, but not the quality of disease data.

In response, two changes have been made to the way the yellow rust ratings are calculated. One of these changes has also been applied to the brown rust ratings.

Weighted ratings: Yellow rust and brown rust

Until now, ratings were based on three-year average disease ratings, with each year of data contributing an equal amount to the rating. Where pathogen populations are relatively stable, this method provides reliable and stable ratings. As wheat yellow and brown rusts populations are increasingly dynamic and diverse, a different approach to the rating-calculation is necessary.

The RL 2021/22 winter wheat rust ratings are now 'weighted', so that the most recent year of data has the largest (and the oldest year of data the smallest) influence on the rating. This approach makes the rating more sensitive to changes in rust population structure in the most recent year, while still using the valuable three-year dataset.

Reset ratings slope: Yellow rust

Established susceptible and resistant varieties are used to determine 'fixed points'. A line between these fixed points is used to estimate the disease ratings for all varieties.

Overtime, the position of the susceptible fixed point has moved as a result of yellow rust population changes. This has had an undesired effect – susceptible varieties were achieving a higher rating at the end of the last decade, than the start of it. For example, a variety with 10% disease would have received a rating of 4 in 2012, but 5 in 2019.

The RL 2021/22 sees the scale reset to the 2012 slope, with a lower susceptible fixed point. This means, compared to the RL 2020/21, the same amount of disease will result in a lower rating. This has reduced the yellow rust rating for many varieties, however, this does not mean that these varieties have become more susceptible since last year. Even on varieties now rated 3, sufficient yellow rust control can be achieved with a combination of chemical and cultural controls.

RL yellow rust ratings reflect adult plant resistance, for young plant resistance and susceptibility see **ahdb.org.uk/ukcpvs**