BARLEY
(Hordeum vulgare)

Proposed denomination: **'AAC Beckett'**
Application number: 23-11333
Application date: 2023/05/03
Applicant: Agriculture & Agri-Food Canada, Brandon, Manitoba
Agent in Canada: Agriculture & Agri-Food Canada, Saskatoon, Saskatchewan
Breeder: Ana Badea, Agriculture & Agri-Food Canada, Brandon, Manitoba

Varieties used for comparison: 'CDC Fibar', 'CDC McGwire', 'CDC Rattan' and 'Merlin'

Summary: *At booting, the frequency of plants with recurved flag leaves is very high for 'AAC Beckett' whereas the frequency is high for 'CDC Fibar' and 'CDC Rattan' and medium for 'CDC McGwire'. The pubescence on the flag leaf blade of 'AAC Beckett' is medium to dense whereas it is absent or very sparse for 'CDC Fibar' and 'CDC Rattan' and absent or very sparse to sparse for 'CDC McGwire' and 'Merlin'. The flag leaf of 'AAC Beckett' is longer than that of 'CDC McGwire', 'CDC Rattan' and 'Merlin'. At the beginning of anthesis, the anthocyanin colouration on the flag leaf auricles of 'AAC Beckett' is absent whereas it is of a weak to medium intensity for 'CDC McGwire' and of a medium to strong intensity for 'CDC Fibar' and 'CDC Rattan'. The anthocyanin colouration on the tips of the lemma awns is absent for 'AAC Beckett' whereas it is of a weak to medium intensity for 'CDC Fibar' and 'CDC McGwire'. At the beginning of ripening, the plants, including the awns, of 'AAC Beckett' are taller than the plants of 'CDC Rattan' and 'Merlin'. The spike of 'AAC Beckett' is of a medium density whereas that of 'CDC Fibar' is dense. Excluding the awns, the spike of AAC Beckett' is longer than those of 'CDC Fibar' and 'Merlin' and shorter than that of 'CDC McGwire'.*

Description:
YOUNG PLANT: erect to semi-erect growth habit at tillering, absent or very sparse to sparse pubescence on lower leaf sheaths
PLANT: two row, spring waxy food type barley, very high frequency of plants with recurved flag leaves

FLAG LEAF (AT BOOTING): medium to dense pubescence on blade
FLAG LEAF SHEATH: strong glaucosity, absent or very sparse pubescence
AURICLES: anthocyanin colouration absent at beginning of anthesis, sparse to medium pubescence on margins

SPIKE: mid-season emergence, absent or very weak to weak degree of glaucosity at end of anthesis, erect attitude, platform shaped collar, parallel shape, medium density, parallel to weakly divergent sterile spikelet attitude, glume and awn of the median spikelet are equal to longer than the grain
LEMMA AWNS: anthocyanin colouration of tips absent, longer than spike, rough spiculations on margins
FIRST SEGMENT OF RACHIS: short, medium to strong curvature

KERNEL: absent or very weak intensity of anthocyanin colouration of nerves of lemma at beginning of ripening, whitish aleurone layer, long rachilla hairs, husk absent, absent or very weak spiculation of inner lateral nerves of dorsal side of lemma, hairless ventral furrow, clasping disposition of lodicules, incomplete horseshoe shape of basal markings, medium length, medium width

DISEASE REACTIONS : resistant to Covered Smut (*Ustilago hordei*) and False Loose Smut (*Ustilago nigra*); moderately resistant to Scald (*Rhynchosporium secalis*) and True Loose Smut (*Ustilago nuda*); moderately resistant to moderately susceptible to Spot Blotch (*Cochliobolus sativus*); moderately susceptible to Stem Rust (*Puccinia graminis*) and Net Blotch (net and spot forms of *Pyrenophora teres*)

Origin and Breeding: 'AAC Beckett' (experimental designations H339-137 and HB20144) originated from a cross between 'Merlin' and the line H303 conducted in the spring of 2014 in a greenhouse at the Agriculture and Agri-Food Canada Brandon Research Centre in Brandon, Manitoba. The early generations were advanced using a modified bulk method. From 2014 to 2015, increases were performed in Brandon, and in Leeston, New Zealand followed by the selection of 400 spikes from short rows grown in Yuma, Arizona, USA in 2015-2016. Three hundred individually threshed spikes were selected based on plant

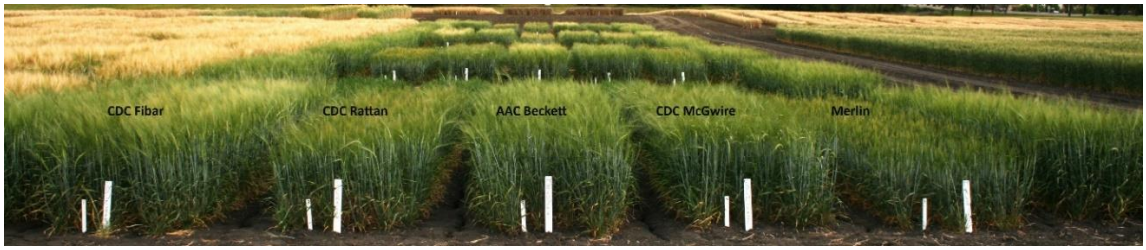
height, maturity, lodging resistance, general appearance and field disease reaction and planted as single F5 hill plots in Brandon, Manitoba. One F6 line, designated as H339-137, was grown in a preliminary yield test at Brandon in 2017 and in replicated yield tests at Brandon and Hamiota, Manitoba in 2018. Advanced selection criteria included yield, heading date, hull retention, kernel plumpness, test and kernel weights, preliminary food quality analyses as well as seedling and field disease testing. H339-137 was further evaluated at 7 locations in Western Canada in 2019 and advanced to the Western Cooperative Hulless Barley Registration test from 2020 to 2021 as HB20144. Breeder seed was established from a bulk of 166 F10 lines selected from 297 rows grown at Brandon, Manitoba in 2021.

Tests and Trials: The comparative trials for 'AAC Beckett' were conducted at the Agriculture and Agri-Food Canada, Brandon Research and Development Centre in Brandon, Manitoba in 2022 and 2023. There were 4 replicates per variety arranged in an RCB design. Plots were 3.8 square metres and consisted of 6 rows with a row length of 4 metres with 0.18 metres between rows. Plots were spaced 46 cm apart. The seeding density was 1200 seeds per plot resulting in approximately 4800 plants per variety. Measured characteristics were based on a minimum of 20 measurements per variety per year. Mean differences were significant at the 5% probability level based on LSD values. Disease reaction ratings were provided through the Disease Evaluation team of the Prairie Recommending Committee for Oat and Barley conducted in 2020 and 2021.

Comparison table for 'AAC Beckett'

	'AAC Beckett'	'CDC Fibar'*	'CDC McGwire'*	'CDC Rattan'*	'Merlin'*
Flag leaf length (cm)					
mean 2022 (LSD=1.15)	12.12	15.22	11.20	9.37	10.47
std. deviation 2022	0.85	0.96	0.48	0.57	0.41
mean 2023 (LSD=1.49)	17.54	14.73	11.58	11.58	9.33
std. deviation 2023	0.94	1.23	1.41	1.06	0.77
Plant height at maturity (stem and spike, including awns) (cm)					
mean 2022 (LSD=1.17)	75.6	76.95	75.65	66.0	54.35
std. deviation 2022	0.92	0.68	0.77	0.69	0.38
mean 2023 (LSD=3.14)	88.45	89.20	88.70	80.90	68.10
std. deviation 2023	1.54	1.45	0.48	3.87	0.77
Spike length (excluding awns) (cm)					
mean 2022 (LSD=0.47)	7.94	7.26	8.73	7.66	6.21
std. deviation 2022	0.15	0.24	0.09	0.34	0.02
mean 2023 (LSD=0.68)	8.29	7.84	9.15	9.51	7.53
std. deviation 2023	0.80	0.26	0.57	0.42	0.20

*reference varieties



Barley: 'AAC Beckett' (centre) with reference varieties 'CDC Fibar' (left), 'CDC Rattan' (centre left), 'CDC McGwire' (centre right) and 'Merlin' (right)

Barley: ‘AAC Beckett’ (centre) with reference varieties ‘CDC McGwire’ (left), ‘CDC Fibar’ (centre left), ‘CDC Rattan’ (centre right) and ‘Merlin’ (right)

Barley: ‘AAC Beckett’ (centre) with reference varieties ‘CDC Fibar’ (left), ‘CDC Rattan’ (centre left), ‘Merlin’ (centre right) and ‘CDC McGwire’ (right)

Proposed denomination: **'Celesta'**
Application number: 22-10806
Application date: 2022/01/26
Applicant: Sollio Agriculture, Saint-Hyacinthe, Quebec
Breeder: Valerie Chabot, Sollio Agriculture, Saint-Hyacinthe, Quebec

Varieties used for comparison: 'Cyane' and 'Rhea'

Summary: *At the 5 to 9 tiller stage, the plants of 'Celesta' have a semi-erect growth habit whereas those of 'Cyane' have a semi-erect to semi-prostrate growth habit. At booting, the frequency of plants with recurved flag leaves is low for 'Celesta' whereas 'Cyane' has a medium frequency of plants with recurved flag leaves. The flag leaf sheath of 'Celesta' has a medium degree of glaucosity whereas that of 'Cyane' has a strong degree of glaucosity. The plants of 'Celesta' head later than those of 'Cyane'. At the beginning of anthesis, the intensity of the anthocyanin colouration of the tips of the lemma awns of 'Celesta' is strong whereas it is medium for 'Rhea' and very weak for 'Cyane'. At the end of anthesis, the spike of 'Celesta' has a medium degree of glaucosity whereas those of the reference varieties have a weak degree of glaucosity. At the beginning of ripening, the spike of 'Celesta' has a platform shaped collar whereas those of the reference varieties have a v-shaped collar. The spike of 'Celesta' is lax whereas it is of medium density for 'Rhea'. The spiculations on the margins of the lemma awns are rough for 'Celesta' whereas they are smooth for the reference varieties. At ripening, the first segment of the rachis for 'Celesta' is of medium length whereas the first segment of the rachis is short for 'Rhea'. 'Celesta' has a strong curvature of the first segment of the rachis whereas 'Rhea' has a medium degree of curvature and 'Cyane' has a weak degree of curvature. The spiculation on the inner lateral nerves of the dorsal side of the lemma on the kernel of 'Celesta' is absent or very weak whereas that of 'Cyane' has a medium degree of spiculation. The kernel of 'Celesta' is of a medium width whereas the kernel of 'Cyane' is wide.*

Description:
YOUNG PLANT: semi-erect growth habit at tillering, absent or very sparse pubescence on lower leaf sheaths
PLANT: six row, spring barley, low frequency of plants with recurved flag leaves

FLAG LEAF (AT BOOTING): absent or very sparse pubescence on sheath, very sparse pubescence on blade
FLAG LEAF SHEATH: medium glaucosity
AURICLES: anthocyanin colouration absent at booting, absent or very sparse pubescence on margins

SPIKE : spike emergence occurs mid-season, medium degree of glaucosity at end of anthesis, semi-erect to horizontal attitude, platform shaped collar, parallel shape, lax, glume and awn of the median spikelet are longer than the grain
LEMMA AWNS: strong intensity of anthocyanin colouration of tips, shorter than spike, rough spiculations on margins

FIRST SEGMENT OF RACHIS: medium length, strong curvature

KERNEL: short rachilla hairs, husk present, absent or very weak intensity of anthocyanin colouration of nerves of lemma, absent or very weak spiculation of inner lateral nerves of dorsal side of lemma, hairless ventral furrow, medium length and width

Origin and Breeding: 'Celesta' (experimental designations CFO1815 and C2M18260) originated from the cross conducted between 'Rhea', as the female parent, and 'Boroe', as the male parent, in a contra-season nursery in the winter of 2010 in Gorbea, Chile. A deferred pedigree selection method was used from the F1 to F5 generations based on yield, maturity, lodging resistance, test weight, 1000 kernel weight and disease resistance. From 2011 to 2014, these generations were grown in Saint-Hyacinthe, Quebec or in Gorbea, Chile. In Saint-Hyacinthe, one line from the F5 generation was designated as CFO1815 in 2014 and seeds from 60 selected spikes were sown in individual rows in 2015. 'Celesta' was then evaluated in performance trials from 2016 to 2018 and advanced trials in 2019 and 2020. Spikes, representing 22 lines of the F9 generation, were selected and bulked to establish breeder seed in 2018.

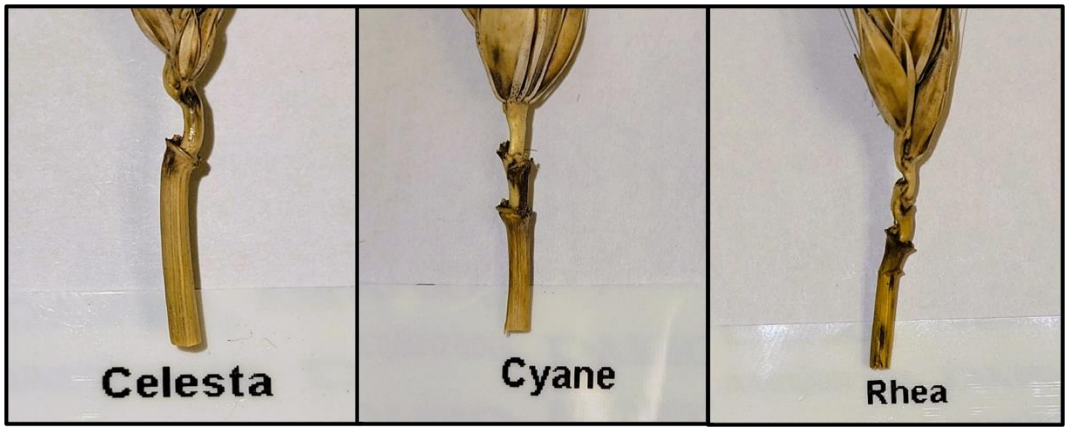
Tests and Trials: The comparative trials for 'Celesta' were conducted at Sollio Agriculture in St-Hyacinthe, Quebec in the 2022 and 2023 growing seasons. There were 4 replicates per variety per year arranged in an RCB design. Plots consisted of 7 rows, each row measuring 4.5 metres long with 0.18 metres inter-row spacing. The seeding density was 333 seeds per square metre resulting in approximately 5328 plants per variety per year. Measured characteristics were based on a minimum of 20 measurements per variety per year.

Comparison table for 'Celesta'

	'Celesta'	'Cyane'*	'Rhea'*
Spike emergence (number of days from planting to when first spikelets is visible in 50% of the plants)			
mean (2022)	55	51	55
mean (2023)	60	58	59

*reference varieties

Barley: 'Celesta' (left) with reference varieties 'Cyane' (centre) and 'Rhea' (right)



Barley: 'Celesta' (left) with reference varieties 'Cyane' (centre) and 'Rhea' (right)

Proposed denomination: **'Ferguson'**
Application number: 23-11199
Application date: 2023/02/09
Applicant: Highland Specialty Grains, Almira, Washington, United States of America
Agent in Canada: Nutrien Ag Solutions, Calgary, Alberta
Breeder: Highland Specialty Grains, Almira, Washington, United States of America

Varieties used for comparison: 'Champion' and 'Claymore'

Summary: *At booting, the flag leaf auricles of 'Ferguson' have a medium intensity of anthocyanin colouration while the flag leaf auricles of 'Champion' have a very weak intensity of anthocyanin colouration and those of 'Claymore' have a weak intensity of anthocyanin colouration. The flag leaf of 'Ferguson' is longer than that of 'Claymore'. At the beginning of anthesis, the lemma awn tips of 'Ferguson' have a very weak to weak intensity of anthocyanin colouration while those of 'Champion' have a medium intensity of anthocyanin colouration. At the end of anthesis, the spike of 'Ferguson' is parallel shaped and lax to a medium density while the spike of 'Champion' is tapering and medium to dense. At ripening, the first segment of the rachis of 'Ferguson' is short while that of 'Champion' is medium in length. The curvature of the first segment of the rachis of 'Ferguson' is weak while it is strong for that of 'Champion' and medium to strong for 'Claymore'. The glume and awn of the median spikelet for 'Ferguson' are longer than the grain while the glume and awn of 'Claymore' are equal to the length of the grain. The inner lateral nerves on the dorsal side of the kernel of 'Ferguson' have an absent or very weak degree of spiculation while those of 'Champion' have a weak to medium degree of spiculation. The kernel of 'Ferguson' is medium to long while it is short for 'Claymore'.*

Description:
YOUNG PLANT: semi-erect growth habit at tillering, absent or very sparse pubescence on lower leaf sheaths
PLANT: two row, spring feed barley

FLAG LEAF (AT BOOTING): sparse pubescence on blade
FLAG LEAF SHEATH: weak to medium glaucosity, very sparse pubescence
AURICLES: medium intensity of anthocyanin colouration at booting, very sparse pubescence on margins

SPIKE: mid-season emergence, medium glaucosity at end of anthesis, semi-erect attitude, v-shaped to platform shaped collar, parallel shape, lax to a medium density, parallel attitude of sterile spikelet, glume and awn of the median spikelet are longer than the grain
LEMMA AWNS: very weak to weak intensity of anthocyanin colouration of tips at beginning of anthesis, longer than spike, rough spiculations on margins
FIRST SEGMENT OF RACHIS: short, weak curvature

KERNEL: weak to medium intensity of anthocyanin colouration of nerves of the lemma at early to soft dough stage, whitish aleurone layer, long rachilla hairs, husk present, absent or very weak spiculation of inner lateral nerves of dorsal side of lemma, hairless ventral furrow, clasping disposition of lodicules, horseshoe shape basal markings, medium to long, medium to wide

AGRONOMIC CHARACTERISTICS: fair to good resistance to lodging, fair to good resistance to shattering, good tolerance to straw breakage, fair to good tolerance to drought

Origin and Breeding: 'Ferguson' (experimental designations TR19758 and HO516-555) was developed by Highland Specialty Grains using a modified bulk pedigree breeding method. The variety originated from a cross between the variety 'Claymore' and a line designated BZ509-443 conducted in 2014 in Casa Grande, Arizona, USA. The variety was advanced from the F1 to F5 generation in the USA based on grain plumpness, resistance to lodging and grain yield with one line being designated HO516-555 in 2016. The variety was further evaluated in the USA and Canada as TR19758 from 2016 to 2020. Breeder seed was established at the F11 generation in 2021.

Tests and Trials: The comparative trials for 'Ferguson' were conducted in Neapolis, Alberta in the 2022 and 2023 growing seasons. There were 3 row blocks each consisting of 3 replicates per variety with the second and third row blocks arranged in a RCB design. The individual plots consisted of 5 rows, 5 metres in length, with 0.25m inter-row spacing and 0.45m spacing between the plots. The seeding density was 275 seeds per square metre resulting in a minimum of 10,000 plants per variety per year. Measured characteristics were based on a minimum of 25 measurements. Mean differences were significant at the 5% probability level based on a paired Student's t-test.

Comparison table for 'Ferguson'

	'Ferguson'	'Champion'*	'Claymore'*
Flag leaf length (at booting) (cm)			
mean (2022)	19.2	17.4	16.3
std. deviation (2022)	3.23	2.76	1.63
mean (2023)	12.7	11.9	10.1
std. deviation (2023)	1.56	2.35	1.05

*reference varieties

Barley: 'Ferguson' (centre) with reference varieties 'Champion' (left) and 'Claymore' (right)

Barley: 'Ferguson' (left) with reference varieties 'Champion' (centre) and 'Claymore' (right)

Proposed denomination: **'Ibex'**
Application number: 22-10885
Application date: 2022/04/19
Applicant: Highland Specialty Grains, Almira, Washington, United States of America
Agent in Canada: Nutrien Ag Solutions, Calgary, Alberta
Breeder: Highland Specialty Grains, Almira, Washington, United States of America

Varieties used for comparison: 'Champion' and 'Claymore'

Summary: *At booting, the flag leaf auricles of 'Ibex' have a medium intensity of anthocyanin colouration while the flag leaf auricles of 'Champion' have a very weak intensity of anthocyanin colouration and those of 'Claymore' have a weak intensity of anthocyanin colouration. The flag leaf of 'Ibex' is wider than that of 'Claymore'. At the beginning of anthesis, the lemma awn tips of 'Ibex' have a very weak to weak intensity of anthocyanin colouration while those of 'Champion' have a medium intensity of anthocyanin colouration. At the end of anthesis, the spike of 'Ibex' is parallel shaped and lax while the spike of 'Champion' is tapering and medium to dense. Excluding the awns, the spike of 'Ibex' is longer than those of the reference varieties. At ripening, the first segment of the rachis of 'Ibex' is short while that of 'Champion' is medium in length. The inner lateral nerves on the dorsal side of the kernel of 'Ibex' have a medium degree of spiculation while those of 'Claymore' have a very weak degree of spiculation.*

Description:
YOUNG PLANT: semi-erect growth habit at tillering, absent or very sparse pubescence on lower leaf sheaths
PLANT: two row, spring feed barley

FLAG LEAF SHEATH: weak to medium glaucosity, sparse pubescence
AURICLES: medium intensity of anthocyanin colouration at booting, very sparse pubescence on margins

SPIKE: mid-season emergence, medium glaucosity at end of anthesis, erect attitude, platform shaped collar, parallel shape, lax, parallel to weakly divergent attitude of sterile spikelet, glume and awn of the median spikelet are longer than the grain
LEMMA AWNS: very weak to weak intensity of anthocyanin colouration of tips at beginning of anthesis, longer than spike, rough spiculations on margins
FIRST SEGMENT OF RACHIS: short, medium to strong curvature

KERNEL: weak to medium intensity of anthocyanin colouration of nerves of the lemma at early to soft dough stage, whitish aleurone layer, long rachilla hairs, husk present, medium spiculation of inner lateral nerves of dorsal side of lemma, hairless ventral furrow, clasping disposition of lodicules, horseshoe shape basal markings, medium length, wide

AGRONOMIC CHARACTERISTICS: fair to good resistance to lodging, fair to good resistance to shattering, fair to good tolerance to straw breakage, good tolerance to drought

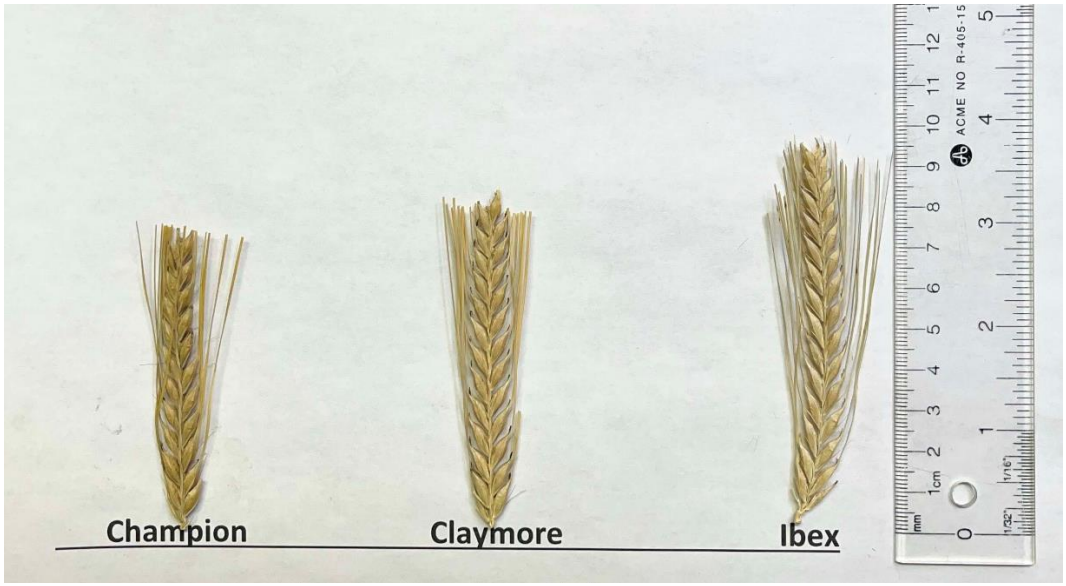
Origin and Breeding: 'Ibex' (experimental designations TR18749 and HO516-350) was developed by Highland Specialty Grains using a modified bulk pedigree breeding method. The variety originated from a cross between the varieties 'Claymore' and 'Oreana' conducted in 2014 in Casa Grande, Arizona, USA. The variety was advanced from the F1 to F5 generation in the USA based on grain plumpness, resistance to lodging and grain yield with one line being designated as HO516-350 in 2016. The variety was further evaluated in Canada as TR18749 from 2016 to 2019. Breeder seed was established at the F10 generation in 2020.

Tests and Trials: The comparative trials for 'Ibex' were conducted in Neapolis, Alberta in the 2021 and 2023 growing seasons. There were 3 row blocks each consisting of 3 replicates per variety with the second and third row blocks arranged in a RCB design. The individual plots consisted of 5 rows, 5 metres in length, with 0.25m inter-row spacing and 0.45m spacing between the plots. The seeding density was 275 seeds per square metre resulting in a minimum of 10,000 plants per variety per year. Measured characteristics were based on a minimum of 25 measurements. Mean differences were significant at the 5% probability level based on a paired Student's t-test.

Comparison table for 'Ibex'

	'Ibex'	'Champion'*	'Claymore'*
Flag leaf width (at booting) (mm)			
mean (2021)	8.7	8.8	7.8
std. deviation (2021)	0.90	0.65	0.80
mean (2023)	7.4	6.0	6.1
std. deviation (2023)	0.96	1.04	0.67
Spike length (excluding awns) (cm)			
mean (2021)	9.7	7.7	8.8
std. deviation (2021)	0.41	0.38	0.32
mean (2023)	8.9	7.4	7.6
std. deviation (2023)	0.82	0.73	1.11

*reference varieties



Barley: 'Ibex' (right) with reference varieties 'Champion' (left) and 'Claymore' (centre)