QUINOA
(Chenopodium quinoa)

Proposed denomination: **'Bastille'**
Application number: 21-10443
Application date: 2021/02/25
Applicant: Stichting Wageningen Research - Wageningen Plant Research, Wageningen, Netherlands
Agent in Canada: Smart & Biggar LP, Ottawa, Ontario
Breeder: Abbottagra S.A.R.L., Longué-Jumelles, France

Varieties used for comparison: 'Atlas', 'Jessie', 'Pasto', 'Riobamba' and 'Dutchess'

Summary: *At 3 to 6 days after emergence, the intensity of anthocyanin colouration on the hypocotyl of 'Bastille' is weak whereas it is of medium intensity on the hypocotyl of 'Altas', 'Dutchess' and 'Jessie' and strong on the hypocotyl of 'Pasto' and 'Riobamba'. At the middle third of the main stem, 'Bastille' has stripes whereas 'Pasto' has no stripes. The leaf axil on the stem of 'Bastille' has no anthocyanin colouration whereas that of 'Pasto' has a medium intensity of anthocyanin colouration. The leaf margin of 'Bastille' has a few indentations whereas the leaf margin of 'Atlas', 'Pasto', 'Riobamba' and 'Dutchess' has a medium number of indentations. The glaucosity on the leaf of 'Bastille' is weak whereas that of 'Dutchess' and 'Pasto' have a medium degree of glaucosity. The plants of 'Bastille' flower earlier than the plants of 'Atlas', 'Pasto', 'Riobamba' and 'Dutchess'. At full flowering, the plants of 'Bastille' are shorter than those of 'Atlas', 'Dutchess' and 'Riobamba'. 'Bastille' has many female flowers per glomerule whereas 'Atlas' and 'Pasto' have a medium number and 'Riobamba' has a few female flowers per glomerule. 'Bastille' is earlier maturing than 'Atlas', 'Dutchess', 'Pasto' and 'Riobamba'. At maturity, the seed head of 'Bastille' is yellow whereas that of 'Riobamba' is orange. The seed of 'Bastille' is yellowish white whereas that of 'Atlas', 'Pasto' and 'Riobamba' is brownish yellow. The thousand seed weight of 'Bastille' is greater than that of 'Atlas', 'Jessie', 'Pasto' and 'Riobamba'.*

Description:
HYPOCOTYL: weak intensity of anthocyanin colouration
COTYLEDON: anthocyanin colouration absent

PLANT: weak tendency to branch, short to medium at full flowering

STEM: green, stripes present on the middle third of main stem, anthocyanin colouration at leaf axil absent

LEAF: green, pigmentation of apex absent, widest part positioned at base, weak glaucosity
LEAF MARGIN: undulated, few indentations

PETIOLE: anthocyanin colouration absent

FLOWERING TIME: early in season
INFLORESCENCE: matures mid-season, glomerulate type, angle of panicles approximately 45 degrees, many female flowers per glomerule, bracts equal in size to utricle, seed head yellow at maturity

SEED: smooth texture of seed coat, ellipsoid shape, yellowish white, saponin content absent

Origin and Breeding: 'Bastille' (experimental designation MEI-14-1) originated from a single plant discovered in a bulk population, of unknown parentage, on a farm in Longué-Jumelles, France in 2011. Diverse progeny from this single plant of interest was sown and bulked in 2012 and, in 2013, a single plant selection was named MEI. From fall 2013 to fall 2014, four selection cycles were done on plants grown in polytunnels. A single F6 plant designated as MEI-14-1 was selected for its' uniformity and further purified in 2015 and 2016. Selection criteria was based on seed size, grain yield, plant height, maturity time and leaf drop at maturity. Breeder seed was derived from a single F7 plant selected in 2016.

Tests and Trials: The comparative trial for 'Bastille' was conducted at the MacDonald Campus of McGill University in Sainte-Anne-de-Bellevue, Quebec in 2023. There were 3 replicates per variety arranged in an RCB design. Plots were 13.3 square metres and consisted of 14 rows with a row length of 5 metres with 0.19 metres between rows. The seeding density of 174 plants per square metre resulted in at least 2300 plants per variety. Measured characteristics were based on 30 measurements per variety except for seed weight which was based on 3 measurements per variety. Mean differences were significant at the 5% probability level based on LSD values. Results were supported by the UPOV report of Technical Examination, reference number 4061210, purchased from The Community Plant Variety Office in Angers, France. The trial was conducted by Groupe d'Étude et de contrôle des Variétés Et des Semences, France at the Testing Station in Brion, France from 2017 to 2018.

Comparison table for 'Bastille'

	'Bastille'	'Atlas'*	'Jessie'*	'Pasto'*	'Riobamba'*	'Dutchess'*
Plant height at full flowering (from base to tip of inflorescence) (cm)						
mean (LSD=10)	99	145	102	97	123	121
std. deviation	8.6	14.9	6.3	8.7	8.2	8.7
Days to maturity (number of days from sowing to when 50% of the plants are dried on the upper third of the plant)						
mean	91	106	91	109	99	98
Thousand seed weight (grams per 1000 seeds) (g)						
mean (LSD=0.15)	2.88	2.48	2.63	2.55	2.33	2.71
std. deviation	0.11	0.04	0.07	0.08	0.01	0.06

*reference varieties

Quinoa: 'Bastille' (top centre) with reference varieties 'Jessie' (top right), 'Atlas' (bottom right), 'Riobamba' (bottom centre), 'Pasto' (bottom left) and 'Dutchess (top left)

Quinoa: 'Bastille' (top centre) with reference varieties 'Jessie' (top right), 'Atlas' (bottom right), 'Riobamba' (bottom centre), 'Pasto' (bottom left) and 'Dutchess' (top left)

Proposed denomination: **'Dutchess'**
Application number: 19-10046
Application date: 2019/11/25
Applicant: Stichting Wageningen Research - Wageningen Plant Research, Wageningen, Netherlands
Agent in Canada: Smart & Biggar LP, Ottawa, Ontario
Breeder: Stichting Wageningen Research - Wageningen Plant Research, Wageningen, Netherlands

Varieties used for comparison: 'Atlas', 'Jessie', 'Pasto' and 'Riobamba'

Summary: *At 3 to 6 days after emergence, the anthocyanin colouration on the hypocotyl of 'Dutchess' is of a medium intensity whereas the intensity of anthocyanin colouration on the hypocotyl of 'Pasto' and 'Riobamba' is strong. At the middle third of the main stem, 'Dutchess' has stripes whereas 'Pasto' has no stripes. The leaf axil on the stem of 'Dutchess' has no anthocyanin colouration whereas that of 'Pasto' has a medium intensity of anthocyanin colouration. The leaf margin of 'Dutchess' has a medium number of indentations whereas the leaf margin of 'Jessie' has a few indentations. The leaf of 'Dutchess' has a medium degree of glaucosity whereas the glaucosity is weak for 'Atlas', 'Jessie' and 'Riobamba'. The plants of 'Dutchess' flower later than the plants of 'Jessie' and flower earlier than the plants of 'Atlas' and 'Riobamba'. At full flowering, the plants of 'Dutchess' are shorter than those of 'Atlas' and taller than those of 'Jessie' and 'Pasto'. 'Dutchess' has many female flowers per glomerule whereas those of 'Atlas' and 'Pasto' have a medium number of female flowers and that of 'Riobamba' has a few female flowers. 'Dutchess' is later maturing than 'Jessie' and earlier maturing than 'Atlas' and 'Pasto'. At maturity, the seed head of 'Dutchess' is yellow whereas that of 'Riobamba' is orange. The seed of 'Dutchess' is yellowish white whereas that of 'Atlas', 'Pasto' and 'Riobamba' is brownish yellow. The thousand seed weight of 'Dutchess' is greater than that of 'Atlas', 'Jessie', 'Pasto' and 'Riobamba'.*

Description:
HYPOCOTYL: medium intensity of anthocyanin colouration
COTYLEDON: anthocyanin colouration absent

PLANT: weak tendency to branch, medium to tall at full flowering

STEM: green, stripes present on the middle third of main stem, anthocyanin colouration at leaf axil absent
LEAF: green, pigmentation of apex absent, widest part positioned at base, medium degree of glaucosity
LEAF MARGIN: undulated, medium number of indentations
PETIOLE: anthocyanin colouration absent

FLOWERING TIME: mid-season
INFLORESCENCE: matures mid-season, glomerulate type, angle of panicles approximately 45 degrees, short, many female flowers per glomerule, bracts equal in size to utricle, seed head yellow at maturity

SEED: smooth texture of seed coat, ellipsoid shape, yellowish white, saponin content absent

Origin and Breeding: 'Dutchess' (experimental designation Pasto offtype 4) originated from a cross between 'Pasto', as the female parent, and an adjacent population of the varieties 'Atlas' and 'Riobamba' and other non bitter elite germplasm selections, as the male parent. The initial cross took place at the Stitching Wageningen Plant Research in Wageningen in the Netherlands in 2011. From a single F1 head harvested, F2 to the F4 families were selfed, evaluated and individual heads selected based on seed size, whiteness of seeds and grain yield from 2012 to 2014. F5 and F6 families were selfed and multiplied in a greenhouse in 2014 and 2015 where each was also assessed for uniformity of additional criteria such as leaf form and colour, flowering time, maturity and plant length. Breeder seed of was derived by bulking uniform F7 families selected in 2015.

Tests and Trials: The comparative trial for 'Dutchess' was conducted at the MacDonald Campus of McGill University in Sainte-Anne-de-Bellevue, Quebec in 2023. There were 3 replicates per variety arranged in an RCB design. Plots were 13.3 square metres and consisted of 14 rows with a row length of 5 metres with 0.19 metres between rows. The seeding density of 174 plants per square metre resulted in at least 2300 plants per variety. Measured characteristics were based on 30 measurements per variety except for seed weight which was based on 3 measurements per variety. Mean differences were significant at the 5% probability level based on LSD values. Results were supported by the UPOV report of Technical Examination, reference number 4059716, purchased from The Community Plant Variety Office in Angers, France. The trial was conducted by Groupe d'Étude et de contrôle des Variétés Et des Semences, France at the Testing Station in Brion, France from 2016 to 2017.

Comparison table for 'Dutchess'

	'Dutchess'	'Atlas'*	'Jessie'*	'Pasto'*	'Riobamba'*
Plant height at full flowering (from base to tip of inflorescence) (cm)					
mean (LSD=10)	121	145	102	97	123
std. deviation 2023	8.7	14.9	6.3	8.7	8.2
Days to maturity (number of days from sowing to when 50% of the plants are dried on the upper third of the plant)					
mean	98	106	91	109	99
Thousand seed weight (grams per 1000 seeds) (g)					
mean (LSD=0.15)	2.71	2.48	2.63	2.55	2.33
std. deviation	0.06	0.04	0.07	0.08	0.01

*reference varieties

Quinoa: 'Dutchess' (top left) with reference varieties 'Jessie' (top right), 'Atlas' (bottom right), 'Riobamba' (bottom centre) and 'Pasto' (bottom left)

Quinoa: 'Dutchess' (top left) with reference varieties 'Jessie' (top right), 'Atlas' (bottom right), 'Riobamba' (bottom centre) and 'Pasto' (bottom left)

Proposed denomination: **'NQ Red'**
Application number: 20-10083
Application date: 2020/01/21
Applicant: Northern Quinoa Production Corporation, Saskatoon, Saskatchewan
Breeder: Marc Vincent, Northern Quinoa Production Corporation, Saskatoon, Saskatchewan

Variety used for comparison: 'NQ94PT'

Summary: *At full flowering, the plants of 'NQ Red' are taller than those of 'NQ94PT'. The plants of 'NQ Red' are later maturing than those of 'NQ94PT'. When maturing, the inflorescence of 'NQ Red' changes colour from green to red to brown whereas that of 'NQ94PT' changes from green to yellowish green to yellow. The seed of 'NQ Red' is dark brown whereas that of 'NQ94PT' is white. The thousand seed weight of 'NQ Red' is greater than that of 'NQ94PT'.*

Description:
HYPOCOTYL: medium intensity of anthocyanin colouration
COTYLEDON: anthocyanin colouration absent

PLANT: weak tendency to branch, tall at full flowering

STEM: green, stripes absent on the middle third of main stem, anthocyanin colouration at leaf axil absent

LEAF: green, pigmentation of apex absent, widest part positioned in the middle, weak glaucosity
LEAF MARGIN: entire, few indentations

PETIOLE: anthocyanin colouration absent

FLOWERING TIME: mid-season
INFLORESCENCE: glomerulate type, angle of panicles less than 45 degrees, seed head colour changes from green to red to brown at maturity

SEED: smooth textured seed coat or testa, discoid shape, dark brown

Origin and Breeding: 'NQ Red' is a sister line to the variety 'NQ94PT' and was selected as a single plant from 'NQ94PT' in the spring of 2017 in Saskatoon, Saskachewan. Over the next three generations, the line was increased and purified for plant type and seed color.

Tests and Trials: The comparative trials for 'NQ Red' were conducted in Elm Creek, Manitoba during the summers of 2020 and 2021. There were 3 replicates per variety arranged in an RCB design. Plots were 9 square metres and consisted of 6 rows measuring 6 metres in length with a row spacing of 23 centimetres. The seeding density resulted in at least 1700 plants per plot per variety per year. Measured characteristics were based on a 60 measurements per variety except seed weight with 21 measurements per variety. Mean differences were significant at the 5% probability level based on paired Student's T-tests.

Comparison table for 'NQ Red'

	'NQ Red'	**'NQ94PT'***
Plant height at full flowering (from base to tip of inflorescence) (cm)		
mean 2020	144.2	132.1
std. deviation 2020	16	11.1
mean 2021	120.2	104.8
std. deviation 2021	19.4	10.0
Days to maturity (number of days from sowing to when 50% of the plants are dried on the upper third of the plant)		
mean 2020	90	86
mean 2021	91	87
Thousand seed weight (grams per 1000 seeds) (g)		
mean 2020	2.98	2.76
std. deviation 2020	0.25	0.15
mean 2021	3.12	2.68
std. deviation 2021	0.10	0.13

*reference variety

Quinoa: 'NQ Red' (left) with reference variety 'NQ94PT' (right)

Quinoa: 'NQ Red' (right) with reference variety 'NQ94PT' (left)