CLOVER
(Trifolium alexandrinum)

Proposed denomination: **'GO-BER-10'**
Application number: 18-9392
Application date: 2018/03/14
Applicant: Grassland Oregon, Inc., Salem, Oregon, United States of America
Agent in Canada: Expert Agriculture Team Ltd., Chilliwack, British Columbia
Breeder: Jerry Lee Hall, Grassland Oregon, Inc., Salem, Oregon, United States of America

Varieties used for comparison: 'Dixie Crimson', 'Border Balansa' and 'Bigbee'

Summary: *The seed coat of 'GO-BER-10' is yellow whereas the seed coat of 'Border Balansa' and 'Bigbee' is multi-coloured. In the year of sowing, the natural plant height of 'GO-BER-10' is taller than that of 'Dixie Crimson' and 'Border Balansa'. After flowering, the stem, including the flower head, of 'GO-BER-10' is longer than that of 'Dixie Crimson and 'Border Balansa' and shorter than that of 'Bigbee'. The plant foliage of 'GO-BER-10' has a medium green intensity whereas that of 'Dixie Crimson' is light green. The plants of 'GO-BER-10' flower earlier than the plants of 'Dixie Crimson' and 'Bigbee' and flower later than that of 'Border Balansa' The flower of 'GO-BER-10' is white whereas the flower of 'Dixie Crimson' is red purple. The peduncle of 'GO-BER-10' is thin whereas the peduncle of 'Dixie Crimson' is thick. The stem of 'GO-BER-10' is thick whereas the stem of 'Dixie Crimson' and 'Bigbee' is of a medium thickness. The middle leaflet of 'GO-BER-10' is narrower than 'Dixie Crimson' and wider than that of 'Border Balansa' and 'Bigbee'. The middle leaflet of 'GO-BER-10' has a small length to width ratio whereas the middle leaflet of 'Dixie Crimson' and 'Border Balansa' has a medium length to width ratio and that of 'Bigbee has a large length to width ratio. The leaf margin of 'GO-BER-10' is serrate whereas the leaf margin is entire for 'Dixie Crimson' and 'Bigbee'.*

Description:
COTYLEDON: very short, very narrow

PLANT: annual type, semi-erect growth habit at end of growing cycle, stolons absent, strong tendency to flower in year of sowing, flowers early to mid-season, tall in year of sowing, medium width

STEM: thick, absent or very sparse pubescence, medium number of internodes, long after flowering

FOLIAGE: medium to dense, medium intensity of green
LEAF : absent or very weak conspicuousness of markings, serrate margin, sparse pubescence on lower side
MIDDLE LEAFLET: ovate shape, medium length, wide, large, small length to width ratio
PETIOLE: very long

PEDUNCLE: thin, long
INFLORESCENCE: many, large diameter, globose shape
FLOWER: white

SEED COAT: yellow

Origin and Breeding: In 2008, a population of plants from private and public collections were grown in Salem, Oregon, USA. Within the populations, 6 plants survived and were subsequently planted in an isolated crossing block. Each plant was harvested and the seed was kept separately. In the winters of 2010 and 2011, all lines were evaluated for cold hardiness in Birmingham, Iowa. Seed from a line designated as 'GO-8-72-4' was identified as the only line that exhibited no cold damage. Progeny of 'GO-8-72-4' was subjected to 3 cycles of recurrent selection and further evaluated for 4 years. 'GO-BER-10' was selected in 2012 based on dry matter yield, crude protein content, and plant vigour and was further propagated by seed.

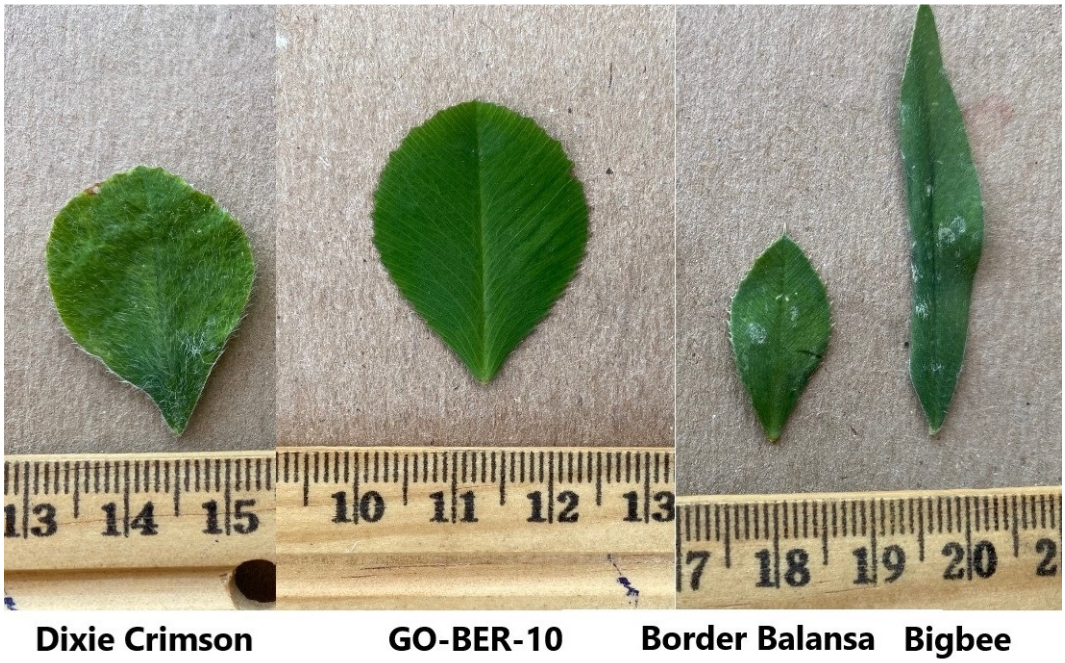
Tests and Trials: The comparative trials for 'GO-BER-10' were conducted in Chilliwack, British Columbia during multiple growing seasons in 2020 and 2022. Trials were conducted in field plots and potted trials. All trials were arranged in a RCB

design with 3 replicates. Field and potted plants were sown, maintained using drip irrigation and placed in rows measuring 5 metres in length and spaced 0.5 metres apart. Potted containers were thinned to 3 plants per 1 gallon pot. A minimum of 60 to 180 plants per variety were included in each trial year. Observations and measured characteristics reported from the potted trials were based on 60 plants or 60 parts of plants. Mean differences were significant at the 5% probability level based on Student's t-tests.

Comparison table for 'GO-BER-10'

	'GO-BER-10'	'Dixie Crimson'*	'Border Balansa'*	'Bigbee'*
Days to flowering (number of days from sowing)				
mean 2020	87	91	83	131
mean 2022	80	86	74	127
Plant natural height (in year of sowing) (cm)				
mean 2020	70.8	44.3	36.1	76.2
std. deviation 2020	9.6	9.2	9.1	19.1
mean 2022	66.6	44.5	36.7	70.6
std. deviation 2022	9.8	8.8	5.7	20.1
Stem length (including flower head) (cm)				
mean 2020	71.3	65.2	49.7	85.3
std. deviation 2020	5.9	12.5	9.8	17.8
mean 2022	68.6	61.0	46.5	85.7
std. deviation 2022	8.8	11.0	11.5	15.0
Middle leaflet width of leaf (cm)				
mean 2020	1.80	2.55	1.16	1.08
std. deviation 2020	0.49	0.52	0.27	0.27
mean 2022	1.99	2.55	1.64	1.12
std. deviation 2022	0.25	0.52	0.31	0.16

*reference varieties



Clover: 'GO-BER-10' (centre left) with reference varieties 'Dixie Crimson' (left), 'Border Balansa' (centre right) and 'Bigbee' (right)

Clover: 'GO-BER-10' (centre right) with reference varieties 'Border Balansa' (left), 'Dixie Crimson' (centre left) and 'Bigbee' (right)

CLOVER
(Trifolium michelianum var. balansae)

Proposed denomination: **'GO BAL 10'**
Trade name: Fixation
Application number: 16-8991
Application date: 2015/07/23 (priority claimed)
Applicant: Grassland Oregon, Inc., Salem, Oregon, United States of America
Agent in Canada: Expert Agriculture Team Ltd., Chilliwack, British Columbia
Breeder: Jerry Lee Hall, Grassland Oregon, Inc., Salem, Oregon, United States of America

Varieties used for comparison: 'Dixie Crimson', 'Border Balansa' and 'Bigbee'

Summary: *The seed coat of 'GO BAL 10' is multi-coloured whereas the seed coat of 'Dixie Crimson' is yellow. In the year of sowing, the natural plant height of 'GO BAL 10' is taller than the natural plant height of 'Border Balansa' and shorter than that of 'Bigbee'. After flowering, the stem, including the flower head, of 'GO BAL 10' is longer than that of 'Dixie Crimson and 'Border Balansa'. The plant of 'GO BAL 10' has a dark green foliage whereas the foliage of 'Dixie Crimson' is light green and that of 'Border Balansa' has a medium green intensity. The plants of 'GO BAL 10' flower earlier than the plants of 'Bigbee' and flower later than those of 'Dixie Crimson' and 'Border Balansa'. The flower of 'GO BAL 10' is white whereas the flower of 'Dixie Crimson' is red purple. The stem of 'GO BAL 10' has sparse pubescence whereas the stem of 'Dixie Crimson' has very dense pubescence. The middle leaflet of 'GO BAL 10' is narrower than 'Dixie Crimson' and wider than that of 'Bigbee'. The leaf margin of 'GO BAL 10' is entire whereas the leaf margin is serrate for 'Border Balansa'. The lower side of the leaf of 'GO BAL 10' has dense pubescence whereas the leaf of 'Border Balansa' and 'Bigbee' have sparse pubescence.*

Description:
COTYLEDON: short, very narrow

PLANT: annual type, erect growth habit at end of growing cycle, stolons absent, strong tendency to flower in year of sowing, flowers mid to late season, medium height in year of sowing, medium width

STEM: medium to thick, sparse pubescence, many internodes, long after flowering

FOLIAGE: medium to dense, dark green
LEAF: absent or very weak conspicuousness of markings, entire margin, dense pubescence on lower side
MIDDLE LEAFLET: elongated shape, medium length and width, large, large length to width ratio
PETIOLE: short

PEDUNCLE: thin to medium thick, medium length
INFLORESCENCE: few to medium number, medium sized diameter, ovoid to globose shape
FLOWER: white

SEED COAT: multi-coloured

Origin and Breeding: 'GO BAL 10' originated from a plant that survived the winter of 2008 in an established nursery of *Trifolium* sp. from a private and public collection in Salem, Oregon, USA. In a greenhouse in Grassland Oregon, the plant identified as 'GO-08-54-3' was allowed to cross with two plants of unknown origin that exhibited a greater recovery from repeated cuttings. The resulting progeny was planted in a nursery in the fall of 2009 and subjected to further cycles of recurrent selection and testing. Final selection occurred in 2012 and was based on cold tolerance, biomass production and uniformity. 'GO BAL 10' was further propagated by seed.

Tests and Trials: The comparative trials for 'GO BAL 10' were conducted in Chilliwack, British Columbia during multiple growing seasons in 2020 and 2022. Trials were conducted in field plots and potted trials. All trials were arranged in a RCB design with 3 replicates. Field and potted plants were sown, maintained using drip irrigation and placed in rows measuring 5 metres in length and spaced 0.5 metres apart. Potted containers were thinned to 3 plants per 1 gallon pot. A minimum of 60 to 180 plants per variety were included in each trial year. Observations and measured characteristics reported from the potted

trials were based on 60 plants or 60 parts of plants. Mean differences were significant at the 5% probability level based on Student's t-tests.

Comparison table for 'GO BAL 10'

	'GO BAL 10'	'Dixie Crimson'*	'Border Balansa'*	'Bigbee'*
Days to flowering (number of days from sowing)				
mean 2020	110	91	83	131
mean 2022	102	86	74	127
Plant natural height (in year of sowing) (cm)				
mean 2020	45.1	44.3	36.1	76.2
std. deviation 2020	11.2	9.2	9.1	19.1
mean 2022	44.9	44.5	36.7	70.6
std. deviation 2022	10.2	8.8	5.7	20.1
Stem length (including flower head) (cm)				
mean 2020	79.5	65.2	49.7	85.3
std. deviation 2020	15.4	12.5	9.8	17.8
mean 2022	77.7	61.0	46.6	85.7
std. deviation 2022	12.0	11.0	11.5	15.0
Middle leaflet width of leaf (cm)				
mean 2020	1.49	2.55	1.16	1.08
std. deviation 2020	0.32	0.52	0.27	0.27
mean 2022	1.36	2.55	1.64	1.11
std. deviation 2022	0.20	0.52	0.31	0.20

*reference varieties

Clover: 'GO BAL 10' (centre left) with reference varieties 'Dixie Crimson' (left), 'Border Balansa' (centre right) and 'Bigbee' (right)

Clover: ‘GO BAL 10’ (centre right) with reference varieties ‘Border Balansa’ (left), ‘Dixie Crimson’ (centre left) and ‘Bigbee’ (right)