



Request for Support for Registration of 'Moravian 165'

Crop: Barley (*Hordeum vulgare* L.)
Type: Two-row, spring, hulled (Malt)
Proposers: Bob Brunick

Malting Barley Variety Development Center
Molson Coors
7 N 400 W
Burley, ID 83318

Test #'s: Pop08-150-034
Pedigree: Moravian 119/CDC Kendall (F1)//Moravian 119
Area of Adaptation: Western U.S. and Alberta, Canada

Description:

Moravian 165 is a high yielding, two-row, hulled malt barley with good adaptability to the Western United States and Alberta, Canada. **Moravian 165** was developed to be grown primarily under dryland production conditions and under ideal moisture conditions **Moravian 165** has yield potential of 110 bu/acre or higher. **Moravian 165** has good crown and stem strength with good resistance to lodging, but may lodge to a low degree (up to 10%) on field ends that are double fertilized and double drilled. **Moravian 165** produces exceptional malt with high extract, low viscosity and very low beta-glucan with grain protein similar to AC Metcalfe. The FAN, AA and DP levels are similar to or slightly higher than AC Metcalfe. **Moravian 165** is produced on nearly 50,000 acres annually in Montana solely for Molson Coors.

Letter of support for registration is forthcoming from Canada Malting Company Ltd.

Strengths:

- Straw strength (> AC Metcalfe with little to no lodging and stem breakage).
- Beta-glucan (lower wort beta-glucan than AC Metcalfe & CDC Copeland)
- Malt extract (> AC Metcalfe & CDC Copeland).
- FAN (slightly higher than AC Metcalfe & CDC Copeland).

Neutral characteristics:

- Test weight (lower than AC Metcalfe).
- Maturity = to AC Metcalfe.
- Malt enzyme activity (slightly higher than AC Metcalfe & CDC Copeland).
- Grain protein similar to AC Metcalfe
- Plant height is 1-2 inches taller than AC Metcalfe

Weaknesses:

- Grain plumpness is low in moisture stressed production conditions.
- Grain protein can be high, 14% or greater, in moisture stressed production conditions.
- Not tested for leaf, stem and root diseases.

| Molson Coors 2013 Hysham, MT Strip Trial (irrigated) | | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------|---------|----------|----------------|-----------------|-------------------|-----------|----------|---------------|----------------|-----------|----------------|-----------|-------|-------|------|--------------------|------------|--------------|------|-----|-----|-------------------|
| Variety | 2013 Bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract Fg Dry | Viscosity | B-Glucan as is | FAN as is | AA DB | DP DB | S/T | Steep-out moisture | Wort Color | Sol. Protein | pH | GE | GC | Water Sensitivity |
| Moravian 115 | 152 | 94.2 | 48.3 | 13.0 | 10.9 | 31.7 | 0.0 | 2.0 | 159 | 82.6 | 1.44 | 68 | 247 | 82 | 113 | 50.5 | 45.5 | 2.6 | 6.0 | 5.8 | 100 | 100 | 8 |
| Moravian 165 | 158 | 95.6 | 52.4 | 13.3 | 11.5 | 41.0 | 0.0 | 2.85 | 166 | 82.2 | 1.46 | 27 | 236 | 80 | 140 | 50.1 | 45.0 | 2.2 | 6.0 | 5.9 | 100 | 100 | 9 |
| Bill Coors 100 | 168 | 93.0 | 50.6 | 12.7 | 11.0 | 31.7 | 0.0 | 2.0 | 174 | 83.1 | 1.46 | 24 | 248 | 88 | 138 | 52.3 | 45.1 | 2.4 | 6.2 | 5.9 | 100 | 100 | 7 |
| Molson Coors 2014 Power, MT Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | | | | |
| Variety | 2014 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG DB | Viscosity | B-Glucan as-is | FAN as is | AA DB | DP DB | S/T | Steep-out moisture | Wort Color | Sol. Protein | pH | | | |
| AC Metcalfe | 114.4 | 75.8 | 51.8 | 13.6 | 9.6 | 38.7 | 0.0 | 2.0 | 167 | 78.9 | 1.60 | 261 | 190 | 74 | 153 | 42.4 | 40.7 | 1.6 | 4.8 | 6.08 | | | |
| Moravian 165 | 115.7 | 74.0 | 50.9 | 13.5 | 9.2 | 41.0 | 0.0 | 2.4 | 157 | 79.1 | 1.49 | 95 | 188 | 69 | 160 | 44.3 | 42.1 | 1.5 | 4.9 | 6.00 | | | |
| Bill Coors 100 | 101.1 | 62.6 | 47.0 | 13.7 | 9.4 | 30.0 | 0.0 | 2.0 | 152 | 78.6 | 1.48 | 93 | 227 | 89 | 175 | 49.7 | 43.7 | 1.8 | 5.7 | 6.10 | | | |
| Molson Coors 2014 Moccasin, MT Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | | | | |
| Variety | 2014 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG DB | Viscosity | B-Glucan as-is | FAN as is | AA DB | DP DB | S/T | Steep-out moisture | Wort Color | Sol. Protein | pH | | | |
| AC Metcalfe | 56.1 | 39.3 | 51.0 | 17.9 | 8.9 | 29.7 | 0 | . | 165 | 73.6 | 1.68 | 318 | 184 | 101 | 206 | 46.1 | 40.1 | 1.51 | 5.4 | 6.06 | | | |
| Moravian 165 | 58.3 | 41.8 | 50.3 | 18.3 | 8.6 | 28.3 | 0 | . | 156 | 74.0 | 1.50 | 147 | 194 | 101 | 223 | 46.8 | 42.1 | 1.49 | 5.6 | 5.95 | | | |
| Bill Coors 100 | 53.7 | 49.3 | 49.7 | 18.1 | 8.8 | 24.5 | 0 | . | 169 | 73.6 | 1.54 | 204 | 185 | 82 | 198 | 44.9 | 42.4 | 1.47 | 5.2 | 6.00 | | | |
| Molson Coors 2014 Soda Springs, ID Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | | | | |
| Variety | 2014 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-Out Moisture | Wort Color | Sol. Protein | p H | | | |
| AC Metcalfe | 89.0 | 52.0 | 47.4 | 14.0 | 10.0 | 30.7 | 0.0 | 1.9 | . | 76.3 | 1.50 | 149 | 189 | 98 | 191 | 42.5 | 44.4 | 1.5 | 5.0 | 5.84 | | | |
| Moravian 165 | 96.0 | 64.0 | 48.5 | 13.1 | 9.9 | 33.3 | 0.0 | 1.8 | . | 77.6 | 1.48 | 99 | 212 | 91 | 182 | 45.5 | 44.6 | 1.6 | 5.4 | 5.81 | | | |
| Bill Coors 100 | 84.8 | 51.1 | 44.8 | 14.0 | 10.0 | 24.7 | 0.0 | 1.8 | . | 77.1 | 1.45 | 83 | 210 | 100 | 218 | 47.4 | 46.1 | 1.7 | 5.6 | 5.78 | | | |

| Molson Coors 2015 Power, MT Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
|---|--------------|---------|----------|----------------|-----------------|-------------------|-----------|----------|---------------|----------------|-----------|----------------|-----------|-------|-------|------|--------------------|------------|--------------|-----|
| Variety | 2015 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep out moisture | Wort Color | Sol. Protein | pH |
| AC Metcalfe | 49.0 | 98.5 | 49.5 | 12.4 | 12.9 | . | 3.7 | 2.0 | 58 | 78.5 | 1.49 | 149 | 213 | 61 | 127 | 41.6 | 45.0 | 2.0 | 5.1 | 5.8 |
| Moravian 165 | 43.9 | 96.8 | 47.6 | 12.0 | 13.0 | . | 2.0 | 2.0 | 124 | 77.9 | 1.42 | 23 | 219 | 72 | 124 | 39.5 | 46.7 | 2.1 | 5.2 | 5.7 |
| Bill Coors 100 | 49.5 | 97.6 | 49.2 | 11.9 | 12.2 | . | 0.0 | 1.5 | 137 | 77.8 | 1.46 | 138 | 221 | 92 | 126 | 38.4 | 45.3 | 2.2 | 5.2 | 5.7 |
| Molson Coors 2015 Moccasin, MT Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | 2015 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep out moisture | Wort Color | Sol. Protein | pH |
| AC Metcalfe | 30.4 | 97.2 | 52.1 | 9.3 | 10.2 | . | 0 | 1.8 | 126 | 81.3 | 1.51 | 153 | 218 | 77 | 90 | 53.2 | 46.3 | 2.2 | 4.9 | 5.9 |
| Moravian 165 | 32.6 | 97.5 | 51.7 | 9.8 | 9.9 | . | 0 | 1.9 | 150 | 81.7 | 1.45 | 52 | 210 | 80 | 102 | 48.2 | 47.5 | 2.1 | 4.7 | 5.8 |
| Bill Coors 100 | 34.8 | 97.7 | 51.0 | 9.3 | 10.1 | . | 0 | 1.5 | 141 | 82.3 | 1.46 | 53 | 214 | 66 | 75 | 52.4 | 47.3 | 2.3 | 4.8 | 5.8 |
| Molson Coors 2015 Soda Springs, ID Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | 2015 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep out moisture | Wort Color | Sol. Protein | pH |
| AC Metcalfe | 62.8 | 97.4 | 54.4 | 15.3 | 9.9 | 32.0 | 6.7 | 1.7 | 92 | 79.4 | 1.53 | 223 | 214 | 73 | 158 | 38.0 | 43.4 | 1.8 | 5.3 | 5.8 |
| Moravian 165 | 60.7 | 94.2 | 52.9 | 16.9 | 9.6 | 30.0 | 2.3 | 1.8 | 69 | 77.8 | 1.43 | 69 | 282 | 85 | 206 | 46.1 | 46.2 | 2.7 | 6.7 | 5.8 |
| Bill Coors 100 | 67.2 | 96.7 | 53.7 | 15.7 | 9.8 | 22.0 | 0.0 | 1.6 | 139 | 77.9 | 1.43 | 116 | 273 | 71 | 167 | 47.2 | 45.4 | 2.6 | 6.7 | 5.8 |
| Molson Coors 2015 Coutts, Alberta, Canada Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | 2015 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Wort Color | Sol. Protein | pH |
| AC Metcalfe | 71.6 | 98.3 | 53.5 | 13.6 | 13.2 | 23.9 | . | . | 186 | 79.6 | 1.50 | 141 | 198 | 76 | 135 | 39.2 | 42.0 | 2.2 | 5.5 | 5.8 |
| Moravian 165 | 69.2 | 98.7 | 52.9 | 13.7 | 12.6 | 25.6 | . | . | 171 | 80.2 | 1.46 | 46 | 231 | 80 | 140 | 42.0 | 44.2 | 2.3 | 5.5 | 5.7 |
| Bill Coors 100 | 77.9 | 98.7 | 52.2 | 12.7 | 13.9 | 21.2 | . | . | 184 | 81.1 | 1.46 | 52 | 243 | 82 | 131 | 46.1 | 43.0 | 2.5 | 5.6 | 5.8 |

| Molson Coors 2016 Power, MT Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
|---|-----------------|------------|-------------|-------------------|--------------------|----------------------|--------------|----------|------------------|-------------------|-----------|-------------------|--------------|-------|-------|------|-----------------------|-------|-----------------|------|
| Variety | 2016 bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AC Metcalfe | 99.9 | 87.7 | 53.0 | 13.3 | 8.6 | 30.0 | 0.0 | 1.7 | 108 | 80.6 | 1.52 | 108 | 205 | 89 | 116 | 42.1 | 43.9 | 1.8 | 4.8 | 5.9 |
| Moravian 165 | 97.2 | 87.1 | 51.9 | 13.3 | 8.5 | 31.7 | 0.0 | 1.8 | 146 | 81.7 | 1.47 | 36 | 182 | 83 | 117 | 42.5 | 44.8 | 1.8 | 4.7 | 5.9 |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| Molson Coors 2016 Moccasin, MT Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | 2016 Bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AC Metcalfe | 47.5 | 75.6 | 53.6 | 13.5 | 8.8 | 23.3 | 0.0 | 1.69 | 158 | 79.0 | 1.45 | 96 | 183 | 87 | 125 | 40.4 | 43.1 | 1.7 | 4.8 | 5.9 |
| Moravian 165 | 48.4 | 70.4 | 52.5 | 13.9 | 8.6 | 23.9 | 0.0 | 1.85 | 147 | 78.2 | 1.45 | 49 | 186 | 83 | 192 | 36.4 | 44.7 | 1.7 | 5.1 | 6.0 |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| Molson Coors 2016 Soda Springs, ID Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | 2016 Bu/acre | % Plump | TW (lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AC Metcalfe | 86.3 | 69.2 | 52.7 | 16.6 | 8.6 | 25.7 | 5.0 | 1.5 | 142 | 75.7 | 1.45 | 77 | 202 | 92 | 205 | 36.3 | 43.9 | 1.91 | 5.5 | 6.11 |
| Moravian 165 | 97.1 | 81.6 | 53.6 | 16.3 | 8.1 | 29.0 | 3.3 | 1.8 | 152 | 76.3 | 1.41 | 25 | 206 | 97 | 204 | 37.0 | 44.0 | 1.70 | 5.6 | 5.93 |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| Molson Coors 2016 Coutts, Alberta, Canada Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | 2016 Bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AC Metcalfe | 97.6 | 97.6 | 53.3 | 12.1 | 9.8 | 27.7 | 0.0 | . | 76 | 80.4 | 1.51 | 224 | 182 | 78 | 136 | 35.9 | 43.8 | 1.9 | 4.4 | 6.1 |
| Moravian 165 | 95.4 | 96.7 | 51.6 | 12.3 | 9.7 | 28.4 | 0.0 | . | 108 | 81.2 | 1.45 | 81 | 203 | 64 | 129 | 46.5 | 45.7 | 1.9 | 5.5 | 6.1 |

| 2017 Molson Coors Taber, Alberta Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
|--|---------------|---------|----------|----------------|-----------------|-------------------|-----------|----------|---------------|----------------|-----------|----------------|-----------|-------|-------|------|--------------------|-------|--------------|------|
| Variety | Yield Bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AAC Synergy | 77.7 | 95.3 | 52.6 | 11.9 | 10.9 | . | 0 | 1.43 | 175 | 79.0 | 1.48 | 196 | 179 | 74 | 136 | 36.1 | 44.0 | 1.5 | 4.8 | 6.01 |
| CDC Copeland | 78.1 | 96.3 | 50.8 | 12.0 | 11.3 | . | 0 | 1.39 | 170 | 78.0 | 1.50 | 131 | 217 | 73 | 137 | 41.7 | 44.8 | 1.7 | 5.4 | 5.95 |
| Bill Coors 100 | 78.6 | 93.6 | 52.1 | 13.8 | 10.3 | . | 0 | 1.47 | 182 | 78.5 | 1.45 | 57 | 270 | 86 | 176 | 45.5 | 45.6 | 2.1 | 6.4 | 5.91 |
| Moravian 165 | 80.2 | 93.6 | 52.1 | 13.4 | 10.3 | . | 0 | 1.81 | 186 | 77.8 | 1.44 | 113 | 268 | 82 | 162 | 40.9 | 45.9 | 1.9 | 6.0 | 5.98 |
| 2017 Molson Coors Coutts, Alberta Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | Yield Bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AAC Synergy | 72.3 | 83.1 | 50.7 | 13.4 | 8.2 | . | 0 | 1.44 | 152 | 78.2 | 1.49 | 114 | 152 | 87 | 133 | 33.6 | 45.8 | 1.3 | 4.4 | 6.08 |
| CDC Copeland | 64.5 | 85.9 | 50.1 | 14.2 | 8.0 | . | 0 | 1.40 | 150 | 77.4 | 1.55 | 191 | 156 | 79 | 143 | 33.4 | 45.6 | 1.3 | 4.5 | 6.07 |
| Bill Coors 100 | 69.2 | 88.1 | 50.0 | 14.7 | 8.0 | . | 0 | 1.43 | 160 | 79.3 | 1.47 | 80 | 171 | 97 | 179 | 33.6 | 46.1 | 1.4 | 4.7 | 6.07 |
| Moravian 165 | 71.6 | 83.5 | 51.1 | 14.9 | 7.8 | . | 0 | 1.81 | 159 | 78.7 | 1.43 | 30 | 180 | 99 | 176 | 34.0 | 46.1 | 1.4 | 4.8 | 5.98 |
| 2017 Molson Coors Fort McLeod, Alberta Strip Trial (Dryland) | | | | | | | | | | | | | | | | | | | | |
| Variety | Yield bu/acre | % Plump | TW (Lbs) | Barley Protein | Barley Moisture | Plant Height (in) | % Lodging | Maturity | RVA Viscosity | Extract FG Dry | Viscosity | B-Glucan as-is | FAN as-is | AA DB | DP DB | S/T | Steep-out moisture | Color | Sol. Protein | pH |
| AAC Synergy | 44.2 | 84.8 | 49.6 | 11.7 | 8.9 | 20.8 | 0 | . | 149 | 79.9 | 1.40 | 29 | 193 | 95 | 136 | 43.2 | 48.1 | 2.0 | 5.4 | 5.97 |
| CDC Copeland | 41.4 | 89.2 | 49.2 | 11.6 | 9.8 | 21.2 | 0 | . | 141 | 78.5 | 1.44 | 73 | 180 | 81 | 135 | 41.7 | 47.1 | 1.9 | 5.2 | 5.99 |
| Bill Coors 100 | 45.6 | 88.1 | 50.4 | 13.0 | 8.4 | 19.0 | 0 | . | 149 | 79.5 | 1.44 | 41 | 214 | 96 | 168 | 43.7 | 47.8 | 2.1 | 5.7 | 5.93 |
| Moravian 165 | 33.8 | 82.5 | 50.5 | 13.6 | 7.8 | 18.5 | 0 | . | 141 | 78.7 | 1.42 | 23 | 238 | 96 | 137 | 47.3 | 48.7 | 2.5 | 6.2 | 5.87 |