Variation of dietary fiber content in 282 common bean genotypes from the middle american gene pool

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## Introduction

282 entries from the BeanCAP study were grown in Fort Collins, CO in 2015 to determine variation in fiber content. All entries originated from the Middle American gene pool and were further subdivided into the following races and market classes:

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| --- | --- |
| Race | # Entries |
| Durango | 131 |
| Jalisco | 55 |
| Mesoamerican | 96 |

|  |  |
| --- | --- |
| Market Class | # Entries |
| pinto | 91 |
| navy | 45 |
| black | 41 |
| GN | 40 |
| small red | 30 |
| pink | 22 |
| carioca | 2 |
| tan | 2 |
| black mottle | 1 |
| flor de mayo | 1 |
| red mottle | 1 |

## Summary Statistics

Below are summary statistics for all dietary fiber components for all entries.

## IDF SDF IDF\_SDF Raff   
## Min. :11.30 Min. : 3.980 Min. :17.95 Min. :0.2231   
## 1st Qu.:13.38 1st Qu.: 7.036 1st Qu.:21.08 1st Qu.:0.3808   
## Median :14.01 Median : 7.588 Median :21.76 Median :0.4335   
## Mean :14.14 Mean : 7.647 Mean :21.79 Mean :0.4498   
## 3rd Qu.:14.82 3rd Qu.: 8.311 3rd Qu.:22.58 3rd Qu.:0.4968   
## Max. :18.88 Max. :10.419 Max. :25.78 Max. :1.0235   
## Stach Verb TOligos TDF   
## Min. :2.847 Min. :0.01055 Min. :3.389 Min. :22.25   
## 1st Qu.:3.589 1st Qu.:0.07138 1st Qu.:4.125 1st Qu.:25.37   
## Median :3.838 Median :0.09947 Median :4.365 Median :26.21   
## Mean :3.848 Mean :0.10113 Mean :4.399 Mean :26.18   
## 3rd Qu.:4.071 3rd Qu.:0.12714 3rd Qu.:4.660 3rd Qu.:26.99   
## Max. :6.476 Max. :0.25548 Max. :7.549 Max. :31.10

## Results: Entries

Tables below show the five entries with the greatest and five entries with the lowest values of each fiber component averaged across the two replications including standard deviation (sd), standard error (se) and confindence intervals (ci).

##### Insoluble Dietary Fiber (IDF)

## Entry mktclass race IDF sd se ci  
## 1: PR0443-151 black mesoamerican 16.91 1.55 1.09 13.89  
## 2: CDC Pinnacle pinto durango 16.73 2.76 1.95 24.80  
## 3: CDC Jet black mesoamerican 16.71 1.32 0.94 11.90  
## 4: TARS-VCI-4B pinto durango 16.46 3.43 2.42 30.79  
## 5: TARS09-RR007 small red jalisco 16.42 0.51 0.36 4.59

## Entry mktclass race IDF sd se ci  
## 1: BelMiNeb-RMR-4 navy mesoamerican 12.34 0.11 0.08 0.97  
## 2: BelMiNeb-RMR-8 navy mesoamerican 12.05 0.38 0.27 3.43  
## 3: BelMiNeb-RMR-7 navy mesoamerican 11.77 0.31 0.22 2.77  
## 4: BelMiNeb-RMR-3 GN durango 11.75 0.22 0.15 1.97  
## 5: AC Pintoba pinto durango 11.44 0.19 0.13 1.70

##### Soluble Dietary Fiber (SDF)

## Entry mktclass race SDF sd se ci  
## 1: Voyager navy mesoamerican 10.29 0.12 0.08 1.03  
## 2: SR7-3 small red jalisco 9.83 0.83 0.59 7.48  
## 3: NW-63 small red jalisco 9.81 0.43 0.30 3.84  
## 4: IP08-2 pinto durango 9.48 0.76 0.53 6.79  
## 5: BelMiNeb 2 GN durango 9.45 0.05 0.03 0.42

## Entry mktclass race SDF sd se ci  
## 1: ABCP-15 pinto durango 5.76 0.56 0.39 5.00  
## 2: Quincy pinto durango 5.53 0.22 0.16 2.00  
## 3: Centa Pupil small red jalisco 5.34 0.52 0.37 4.69  
## 4: TARS-VCI-4B pinto durango 5.16 1.32 0.93 11.84  
## 5: I9365-5 pink jalisco 5.09 1.57 1.11 14.13

##### Raffinose (Raff)

## Entry mktclass race Raff sd se ci  
## 1: NE1-09-20 GN durango 0.92 0.06 0.04 0.50  
## 2: CDC Crocus GN durango 0.85 0.05 0.04 0.47  
## 3: I9365-31 black mesoamerican 0.85 0.25 0.18 2.24  
## 4: A-55 black mesoamerican 0.79 0.06 0.04 0.56  
## 5: NE1-09-9 GN durango 0.79 0.10 0.07 0.86

## Entry mktclass race Raff sd se ci  
## 1: Sawtooth GN durango 0.30 0.11 0.08 0.96  
## 2: USRM-20 small red jalisco 0.30 0.03 0.02 0.28  
## 3: Bill Z pinto durango 0.28 0.01 0.01 0.13  
## 4: Ind. Jamaica Red red mottle jalisco 0.28 0.07 0.05 0.60  
## 5: Apache pinto durango 0.27 0.01 0.01 0.07

##### Stachyose (Stach)

## Entry mktclass race Stach sd se ci  
## 1: ND021717 black mesoamerican 5.16 1.86 1.31 16.69  
## 2: Centa Pupil small red jalisco 4.90 0.26 0.18 2.29  
## 3: Ind. Jamaica Red red mottle jalisco 4.89 0.43 0.31 3.90  
## 4: GN Star GN durango 4.78 0.17 0.12 1.57  
## 5: Inta Precoz small red jalisco 4.70 0.28 0.20 2.48

## Entry mktclass race Stach sd se ci  
## 1: ND040494-4 pinto durango 3.10 0.24 0.17 2.11  
## 2: NE1-09-9 GN durango 3.07 0.32 0.23 2.86  
## 3: NE1-09-20 GN durango 3.03 0.08 0.05 0.69  
## 4: T9905 navy mesoamerican 3.00 0.10 0.07 0.93  
## 5: F07-449-9-3 small red jalisco 2.99 0.18 0.13 1.61

##### Verbascose (Verb)

## Entry mktclass race Verb sd se ci  
## 1: Ind. Jamaica Red red mottle jalisco 0.233 0.031 0.022 0.281  
## 2: Pink Floyd pink jalisco 0.233 0.002 0.001 0.017  
## 3: ROG 312 pink jalisco 0.229 0.024 0.017 0.216  
## 4: ABC-Weihing GN durango 0.201 0.016 0.011 0.143  
## 5: GN Star GN durango 0.201 0.002 0.002 0.020

## Entry mktclass race Verb sd se ci  
## 1: NE1-09-22 GN durango 0.038 0.001 0.001 0.012  
## 2: T9905 navy mesoamerican 0.037 0.011 0.008 0.096  
## 3: A-55 black mesoamerican 0.036 0.035 0.025 0.317  
## 4: GN9-4 GN durango 0.033 0.032 0.022 0.284  
## 5: McHale navy mesoamerican 0.021 0.006 0.004 0.050

##### Total Oligosachharides (TOligos) = Raff + Stach + Verb

## Entry mktclass race TOligos sd se ci  
## 1: ND021717 black mesoamerican 5.98 2.22 1.57 19.92  
## 2: Centa Pupil small red jalisco 5.45 0.18 0.13 1.62  
## 3: Ind. Jamaica Red red mottle jalisco 5.40 0.47 0.33 4.22  
## 4: GN Star GN durango 5.39 0.23 0.16 2.04  
## 5: Inta Precoz small red jalisco 5.32 0.25 0.18 2.24

## Entry mktclass race TOligos sd se ci  
## 1: Mariah pinto durango 3.60 0.30 0.21 2.67  
## 2: NE1-09-19 GN durango 3.57 0.08 0.06 0.71  
## 3: ND040494-4 pinto durango 3.55 0.14 0.10 1.24  
## 4: T9905 navy mesoamerican 3.53 0.12 0.09 1.08  
## 5: F07-449-9-3 small red jalisco 3.50 0.06 0.04 0.57

##### Total Dietary Fiber (TDF) = IDF + SDF + Raff + Stach + Verb

## Entry mktclass race TDF sd se ci  
## 1: PR0443-151 black mesoamerican 30.23 1.22 0.87 11.00  
## 2: IP08-2 pinto durango 30.06 0.15 0.11 1.39  
## 3: ND021717 black mesoamerican 29.78 0.83 0.59 7.48  
## 4: AC Resolute GN durango 29.45 1.57 1.11 14.08  
## 5: Max pinto durango 28.59 0.81 0.57 7.26

## Entry mktclass race TDF sd se ci  
## 1: T9905 navy mesoamerican 23.59 0.93 0.66 8.39  
## 2: Norstar navy mesoamerican 23.43 0.31 0.22 2.77  
## 3: BelMiNeb-RMR-7 navy mesoamerican 23.36 0.12 0.08 1.05  
## 4: Topaz pinto durango 23.18 0.00 0.00 0.02  
## 5: AC Pintoba pinto durango 22.82 0.80 0.57 7.19

## Results: Marketclass

|  |  |
| --- | --- |
| mktclass | IDF |
| black | 0.02077a |

## - Boxplots

Figures below depict fiber content by market class.

##Boxplots by Marketclass: Oligosaccharides  
source('boxplot.mktclass.R')  
plot\_grid(p.Verb.mkt, p.Raff.mkt, p.Stach.mkt, p.TOligos.mkt, labels = c("A", "B", "C", "D"), ncol = 2)

## Results: Race

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Race | IDF | Verb | Raff | Stach | TOligos | TDF |
| Durango | 0.46a | 0.46a | 0.46a | 0.46a | 0.46a | 0.46a |
| Jalisco | 0.03b |
| Mesoamerican | 0.05a |

## - Boxplots

Figures below depict fiber content by race.

geometry: - tmargin=2cm - bmargin=2cm - lmargin=2cm - rmargin=3cm