

**Round Test 2021-2 on
Stickiness Characterization Methods**

- FINAL REPORT –

date: December 15, 2020

**Stickiness Task Force of the 'International Committee
on Cotton Testing Methods' (ICCTM) of the
'International Textile Manufacturers Federation'
(ITMF)**

**Gourlot Jean-Paul ⁽¹⁾
Drieling Axel ⁽²⁾
Froese Karsten ⁽³⁾
Lassus Serge ⁽¹⁾**

⁽¹⁾ CIRAD, France, ⁽²⁾ FIBRE, Germany, and ⁽³⁾ ICA Bremen, Germany

Contents

Introduction	4
Confidentiality and use of information from this report	4
Preparation of cottons and samples	4
Organization of this report	5
Conversion of 'laboratories raw records' into numeric data for use in this report	6
All individual results per Method and LabID for each cotton	8
Table for Cotton A	9
Table for Cotton B	10
Table for Cotton C	11
Table for Cotton D	12
Table for Cotton E	13
Statistics per Method, LabID for each cottons	14
Table for Cotton A	15
Table for Cotton B	16
Table for Cotton C	17
Table for Cotton D	18
Table for Cotton E	19
Data presented by boxplots per Method, LabID for each cotton	20
Charts of individual readings per Method and LabID for each cotton	21
Correlation charts and correlation values between LabID using a same Method for all cottons	30
Charts Variance = f(Mean) for each Cotton and Method, taking care of LabIDs	35
Cotton A : Variance between individual measurements = f(Mean) for all concerned labs	35
Cotton B : Variance between individual measurements = f(Mean) for all concerned labs	44
Cotton C : Variance between individual measurements = f(Mean) for all concerned labs	53
Cotton D : Variance between individual measurements = f(Mean) for all concerned labs	62
Cotton E : Variance between individual measurements = f(Mean) for all concerned labs	71
CSITC type charts: distance Delta of Lab readings to the Grand Mean by Method and by LabID	80
CSITC type chart for Method Caramelization	80
CSITC type chart for Method Contest-S	83
CSITC type chart for Method H2SD	91
CSITC type chart for Method KOTITI	99
CSITC type chart for Method Minicard	100
CSITC type chart for Method MinicardC	101
CSITC type chart for Method Qualitative method	102
CSITC type chart for Method Quantitative method	103
CSITC type chart for Method SCT	105
CommonScale	115
Principle	115
Limitations of the CommonScale approach	116
CommonScale charts	117
Overall statistics per Cotton and Method	122
Mean, standard deviation and CV between instruments by method, Cotton A	123
Mean, standard deviation and CV between instruments by method, Cotton B	124

Mean, standard deviation and CV between instruments by method, Cotton C	125
Mean, standard deviation and CV between instruments by method, Cotton D	126
Mean, standard deviation and CV between instruments by method, Cotton E	127
Frequently asked questions (Q) and answers (A)	128
Software components to realize this report	129
General conclusions about the results of this round-test	131

Round Test on stickiness characterization 2021-2

- FINAL REPORT -

data: December 15, 2021

**Stickiness Task Force of the 'International Committee
on Cotton Testing Methods' (ICCTM) of the
'International Textile Manufacturers Federation'
(ITMF)**

Gourlot Jean-Paul (1)

Drieling Axel (2)

Froese Karsten (3)

Lassus Serge (1)

(1) CIRAD, France, (2) FIBRE, Germany, and (3) ICA Bremen, Germany

Introduction

Confidentiality and use of information from this report

This report is both public and confidential:

- It is public as it will be released on the internet website of the ITMF (www.itmf.org) without providing any private information.
- It also is confidential as we provide Participating Laboratories with their own confidential laboratory LabID code that gives access to understanding each piece of information of the report; indeed with this LabID code number, more information can be extracted from the report. Please note that this LabID is changed for each test.

The Authors will not be held responsible to any degree for dissemination of the LabID code after the confidential distribution of their LabID code to the participating laboratories.

Gourlot Jean-Paul, Drieling Axel, Froese Karsten, Lassus Serge. 2021. Round Test 2021-2 on stickiness characterization methods - Final report. Montpellier : CIRAD-ITMF, 132 p.

Preparation of cottons and samples

A range of five cottons was selected for their stickiness potential range. Basically, the stickiness level of these cottons is not known a priori and their level is being better known after the test, expecting that these cottons cover a range of stickiness.

All cottons in this test got a similar level of homogenization using an homogenizing machine developed during CFC/ICAC/33 project ‘CSITC’ project (so called CSITC homogenizing machine). The main goal of this preparation is to ensure that any drawn sample from the original mass would carry the “same” stickiness potential as any other sample for evaluating the laboratory performance, but without affecting too much the size of individual sticky points that could affect some measurement methods.

The degree of this preparation affects the distribution of sticky points within the mass of the fibers. When an homogenization is ‘perfectly performed’, then the sticky point distribution follows Poisson’s distribution within the fibers; in other cases, sticky point distribution follows over-dispersed distributions, such as negative binomial distributions, meaning that sticky points may be ‘grouped’ in some parts of the material while the rest of the material remains free of stickiness. In these conditions, many repetitions of measurements are required to statistically compare laboratory performances or method performances.

From the beginning, we knew that homogenizing the cottons would induce some ‘preparation’, and this was several times reported to us with the results. However, this has been the only way to ensure that all samples

would be ‘alike’ for any given cotton in order to compare method performances or laboratory performances within methods.

Once the cottons were homogenized, samples were drawn from their original cotton mass, and sets of cottons were constituted for each participating laboratory, whatever the method used. Envelopes were sent out to laboratories in mid April 2021.

All laboratories were supposed to send their results back by December 7, 2021. This FINAL REPORT is prepared after this date when most Laboratories who received the material lately sent back their results.

Organizing this round-test, at present running for free, takes time and uses precious materials; therefore we really appreciate when all registered Laboratories who received RT samples provide us with results.

Organization of this report

As stated in the Contents,

- Individual results provided by Participating Laboratories are reported, cotton by cotton, sorted by method and then by LabID. A mail is sent out in a confidential manner to each participating laboratory for reading this public report, and therefore getting more out of it.
- Statistics are then presented in summary tables or in charts, cotton by cotton, sorted by method and then by LabID. This section allows the comparison of results by LabID within each method. Both the mean results and the variation of individual results are then highlighted.
- Correlation matrix are given for comparing LabID Mean results cotton by cotton, and sorted by method.
- Charts linking the within-laboratory variances of LabIDs for each method to the calculated mean results per LabID are displayed. Precision and accuracy of individual LabID performance can be deduced from these charts.
- Finally, distances between LabID mean result to the Grand Mean are displayed by method, sorted by method and by LabID.

Conversion of ‘laboratories raw records’ into numeric data for use in this report

Answers to this round-test were provided **freely** by laboratories in a table having five columns (one per cotton) and six lines (for potentially recording six results for each cotton) for a total of 30 table cells.

For comparing results between laboratories, results were expected to be reported in a coordinated and harmonized manner within each method. However, for this test also, laboratories reported results the way they probably are used to do in their every day practice: the observation is that the report was not always harmonized within methods.

Under necessity and for allowing a comparison, we may be obliged to convert some laboratory records into harmonized numeric values by applying the following rules when needed (most acronyms are explained in the ‘Frequently asked questions’ section):

- For Caramelization : one measurement = one cell. No transformation of the data.
- For Clinitest: >1: was converted into 1.5.
- For Contest and Fibermap: Since RT2018-1 included: these devices are using the same technology for characterizing stickiness and their results are grouped together into one single ‘Contest-Fibermap’ category. Since March 2020, Contest-S was recognized by ITMF-ICCTM, and therefore Contest-S becomes the name of this category. No transformation of the data.
- For GB/T13785-1992: one measurement = one cell. No transformation of the data.
- For H2SD: one measurement = one cell. No transformation of the data.
- For HSI-NIR: one measurement = one cell. No transformation of the data that has been calibrated to H2SD count at the beginning.
- For KOTITI: grades were converted into numeric values as follows:
 - A: 0
 - A+ = B-: 1
 - B: 2
 - B+ = C-: 3
 - C: 4
 - C+ = D-: 5
 - D: 6
 - D+ = E-: 7
 - E: 8
 - E+: 9.
- For minicard: ITMF grades 0 to 3 were used for reporting, one measurement = one cell. No transformation of the data.

- For Qualitative:
 - NIL: 0
 - Trace: 1
 - Light: 2
 - Moderate : 3.
- For SCT: one measurement = one record = sum of reading of top foil + reading of bottom foil.
- For TDM-A: one measurement = one record. No transformation of the data.

All individual results per Method and LabID for each cotton ¹

¹Footnote

* Results sorted by Method and then by LabID.

* NA or NaN : no results provided.

Table for Cotton A

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	40	2.8	NA	NA	NA	NA	NA	Color degree
Carameliza	105	2.2	1.7	NA	NA	NA	NA	Color degree
Carameliza	180	3.1	2.6	NA	NA	NA	NA	Color degree
Contest-S	5	338.0	451.0	304.0	274.0	317.0	319.0	C/F Grade
Contest-S	15	438.0	315.0	431.0	545.0	545.0	435.0	C/F Grade
Contest-S	25	634.0	507.0	414.0	349.0	372.0	430.0	C/F Grade
Contest-S	35	356.0	431.0	366.0	411.0	500.0	440.0	C/F Grade
Contest-S	115	369.0	526.0	311.0	475.0	244.0	NA	C/F Grade
Contest-S	135	339.0	298.0	438.0	339.0	392.0	395.0	C/F Grade
Contest-S	155	508.0	512.0	523.0	445.0	442.0	472.0	C/F Grade
Contest-S	170	411.0	448.0	512.0	340.0	348.0	514.0	C/F Grade
H2SD	30	25.0	37.0	20.0	28.0	59.0	35.0	Sticky point
H2SD	55	49.0	46.0	36.0	43.0	54.0	68.0	Sticky point
H2SD	70	51.0	31.0	27.0	32.0	51.0	35.0	Sticky point
H2SD	85	31.0	26.0	64.0	45.0	23.0	33.0	Sticky point
H2SD	95	48.0	35.0	27.0	31.0	29.0	38.0	Sticky point
H2SD	110	28.0	30.0	22.0	19.0	20.0	27.0	Sticky point
H2SD	150	45.0	36.0	51.0	43.0	51.0	40.0	Sticky point
H2SD	165	33.0	52.0	41.0	49.0	30.0	42.0	Sticky point
KOTITI	75	8.0	8.0	8.0	8.0	8.0	8.0	KOTITI Grade
Minicard	45	2.5	2.5	3.0	NA	NA	NA	ITMF grade
MinicardC	140	5.5	5.5	6.0	NA	NA	NA	Cirad grade
Qualitativ	130	2.0	2.0	2.0	2.0	2.0	2.0	Grade
Quantitati	10	0.7	0.5	0.8	0.8	0.9	0.8	Percent
Quantitati	80	0.1	0.1	0.1	0.2	0.1	0.1	Percent
SCT	20	77.0	58.0	70.0	NA	NA	NA	Sticky point
SCT	50	36.0	38.0	40.0	34.0	30.0	32.0	Sticky point
SCT	60	33.0	33.0	26.0	NA	NA	NA	Sticky point
SCT	65	63.0	57.0	74.0	NA	NA	NA	Sticky point
SCT	90	40.0	41.0	50.0	41.0	50.0	44.0	Sticky point
SCT	100	70.0	63.0	85.0	NA	NA	NA	Sticky point
SCT	120	63.0	87.0	72.0	NA	NA	NA	Sticky point
SCT	125	91.0	68.0	88.0	NA	NA	NA	Sticky point
SCT	145	49.0	55.0	62.0	57.0	52.0	54.0	Sticky point
SCT	160	72.0	98.0	94.0	NA	NA	NA	Sticky point

Table for Cotton B

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	40	2.7	NA	NA	NA	NA	NA	Color degree
Carameliza	105	1.6	1.7	NA	NA	NA	NA	Color degree
Carameliza	180	2.4	2.8	NA	NA	NA	NA	Color degree
Contest-S	5	33.0	43.0	61.0	52.0	62.0	72.0	C/F Grade
Contest-S	15	61.0	110.0	117.0	68.0	90.0	81.0	C/F Grade
Contest-S	25	82.0	40.0	38.0	55.0	64.0	56.0	C/F Grade
Contest-S	35	42.0	56.0	59.0	48.0	54.0	24.0	C/F Grade
Contest-S	115	105.0	120.0	107.0	141.0	39.0	82.0	C/F Grade
Contest-S	135	73.0	96.0	65.0	71.0	71.0	56.0	C/F Grade
Contest-S	155	172.0	98.0	102.0	194.0	58.0	151.0	C/F Grade
Contest-S	170	143.0	104.0	98.0	79.0	142.0	128.0	C/F Grade
H2SD	30	11.0	5.0	6.0	7.0	4.0	11.0	Sticky point
H2SD	55	11.0	17.0	31.0	8.0	30.0	7.0	Sticky point
H2SD	70	20.0	16.0	26.0	13.0	18.0	11.0	Sticky point
H2SD	85	9.0	6.0	4.0	9.0	17.0	11.0	Sticky point
H2SD	95	10.0	8.0	9.0	11.0	5.0	9.0	Sticky point
H2SD	110	1.0	0.0	3.0	2.0	4.0	1.0	Sticky point
H2SD	150	7.0	16.0	14.0	15.0	11.0	15.0	Sticky point
H2SD	165	11.0	16.0	18.0	11.0	11.0	14.0	Sticky point
KOTITI	75	5.0	4.0	4.0	5.0	5.0	4.0	KOTITI Grade
Minicard	45	0.8	0.5	0.5	NA	NA	NA	ITMF grade
MinicardC	140	2.5	2.0	2.0	NA	NA	NA	Cirad grade
Qualitativ	130	1.0	1.0	1.0	1.0	1.0	1.0	Grade
Quantitati	10	0.4	0.5	0.5	0.4	0.4	0.5	Percent
Quantitati	80	0.2	0.2	0.2	0.2	0.2	0.1	Percent
SCT	20	6.0	6.0	16.0	NA	NA	NA	Sticky point
SCT	50	11.0	7.0	11.0	15.0	10.0	12.0	Sticky point
SCT	60	5.0	7.0	12.0	NA	NA	NA	Sticky point
SCT	65	10.0	5.0	7.0	NA	NA	NA	Sticky point
SCT	90	8.0	8.0	3.0	3.0	7.0	5.0	Sticky point
SCT	100	22.0	26.0	17.0	NA	NA	NA	Sticky point
SCT	120	17.0	22.0	18.0	NA	NA	NA	Sticky point
SCT	125	26.0	19.0	17.0	NA	NA	NA	Sticky point
SCT	145	18.0	12.0	14.0	13.0	11.0	17.0	Sticky point
SCT	160	30.0	23.0	25.0	NA	NA	NA	Sticky point

Table for Cotton C

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	40	2.6	NA	NA	NA	NA	NA	Color degree
Carameliza	105	1.3	1.7	NA	NA	NA	NA	Color degree
Carameliza	180	2.6	2.3	NA	NA	NA	NA	Color degree
Contest-S	5	346.0	411.0	302.0	288.0	242.0	334.0	C/F Grade
Contest-S	15	536.0	364.0	434.0	400.0	399.0	446.0	C/F Grade
Contest-S	25	387.0	354.0	399.0	405.0	365.0	509.0	C/F Grade
Contest-S	35	294.0	301.0	318.0	241.0	295.0	271.0	C/F Grade
Contest-S	115	475.0	535.0	268.0	327.0	345.0	NA	C/F Grade
Contest-S	135	326.0	329.0	225.0	318.0	297.0	344.0	C/F Grade
Contest-S	155	382.0	458.0	442.0	292.0	394.0	433.0	C/F Grade
Contest-S	170	586.0	508.0	432.0	526.0	447.0	416.0	C/F Grade
H2SD	30	40.0	38.0	49.0	53.0	29.0	38.0	Sticky point
H2SD	55	37.0	34.0	40.0	37.0	62.0	48.0	Sticky point
H2SD	70	46.0	42.0	28.0	25.0	43.0	33.0	Sticky point
H2SD	85	38.0	40.0	34.0	35.0	39.0	59.0	Sticky point
H2SD	95	22.0	17.0	13.0	13.0	15.0	14.0	Sticky point
H2SD	110	36.0	40.0	30.0	38.0	27.0	41.0	Sticky point
H2SD	150	73.0	47.0	34.0	28.0	34.0	27.0	Sticky point
H2SD	165	47.0	27.0	35.0	27.0	31.0	27.0	Sticky point
KOTITI	75	8.0	8.0	8.0	8.0	8.0	8.0	KOTITI Grade
Minicard	45	1.5	1.8	2.0	NA	NA	NA	ITMF grade
MinicardC	140	4.0	4.5	5.0	NA	NA	NA	Cirad grade
Qualitativ	130	1.0	1.0	1.0	1.0	1.0	1.0	Grade
Quantitati	10	0.6	0.5	0.5	0.3	0.3	0.3	Percent
Quantitati	80	0.1	0.1	0.1	0.1	0.0	0.1	Percent
SCT	20	70.0	50.0	67.0	NA	NA	NA	Sticky point
SCT	50	31.0	22.0	32.0	36.0	40.0	45.0	Sticky point
SCT	60	45.0	46.0	52.0	NA	NA	NA	Sticky point
SCT	65	50.0	80.0	66.0	NA	NA	NA	Sticky point
SCT	90	57.0	61.0	52.0	44.0	53.0	41.0	Sticky point
SCT	100	63.0	75.0	76.0	NA	NA	NA	Sticky point
SCT	120	82.0	72.0	60.0	NA	NA	NA	Sticky point
SCT	125	50.0	57.0	53.0	NA	NA	NA	Sticky point
SCT	145	40.0	48.0	47.0	45.0	42.0	44.0	Sticky point
SCT	160	99.0	107.0	118.0	NA	NA	NA	Sticky point

Table for Cotton D

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	40	2.6	NA	NA	NA	NA	NA	Color degree
Carameliza	105	1.7	1.9	NA	NA	NA	NA	Color degree
Carameliza	180	3.1	2.7	NA	NA	NA	NA	Color degree
Contest-S	5	330.0	357.0	294.0	320.0	254.0	271.0	C/F Grade
Contest-S	15	423.0	335.0	324.0	385.0	403.0	362.0	C/F Grade
Contest-S	25	563.0	328.0	441.0	391.0	324.0	470.0	C/F Grade
Contest-S	35	287.0	235.0	358.0	385.0	324.0	345.0	C/F Grade
Contest-S	115	400.0	426.0	356.0	402.0	448.0	225.0	C/F Grade
Contest-S	135	304.0	408.0	264.0	319.0	319.0	390.0	C/F Grade
Contest-S	155	497.0	408.0	408.0	418.0	315.0	434.0	C/F Grade
Contest-S	170	480.0	615.0	611.0	383.0	559.0	427.0	C/F Grade
H2SD	30	34.0	18.0	33.0	21.0	25.0	24.0	Sticky point
H2SD	55	20.0	20.0	21.0	24.0	27.0	34.0	Sticky point
H2SD	70	31.0	29.0	25.0	17.0	26.0	38.0	Sticky point
H2SD	85	24.0	39.0	20.0	37.0	24.0	18.0	Sticky point
H2SD	95	23.0	21.0	25.0	12.0	15.0	16.0	Sticky point
H2SD	110	3.0	6.0	7.0	2.0	4.0	6.0	Sticky point
H2SD	150	50.0	32.0	44.0	33.0	19.0	27.0	Sticky point
H2SD	165	27.0	37.0	35.0	13.0	42.0	30.0	Sticky point
KOTITI	75	8.0	8.0	8.0	8.0	8.0	8.0	KOTITI Grade
Minicard	45	1.8	2.5	3.0	NA	NA	NA	ITMF grade
MinicardC	140	4.5	5.5	6.5	NA	NA	NA	Cirad grade
Qualitativ	130	1.0	1.0	1.0	1.0	1.0	1.0	Grade
Quantitati	10	0.4	0.3	0.4	0.3	0.3	0.4	Percent
Quantitati	80	0.2	0.1	0.1	0.1	0.1	0.1	Percent
SCT	20	36.0	33.0	39.0	NA	NA	NA	Sticky point
SCT	50	38.0	41.0	20.0	23.0	27.0	40.0	Sticky point
SCT	60	35.0	49.0	34.0	NA	NA	NA	Sticky point
SCT	65	13.0	15.0	12.0	NA	NA	NA	Sticky point
SCT	90	29.0	28.0	28.0	28.0	23.0	25.0	Sticky point
SCT	100	38.0	39.0	32.0	NA	NA	NA	Sticky point
SCT	120	34.0	49.0	37.0	NA	NA	NA	Sticky point
SCT	125	32.0	27.0	24.0	NA	NA	NA	Sticky point
SCT	145	69.0	68.0	71.0	70.0	69.0	66.0	Sticky point
SCT	160	64.0	53.0	52.0	NA	NA	NA	Sticky point

Table for Cotton E

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Carameliza	40	3.1	NA	NA	NA	NA	NA	Color degree
Carameliza	105	2.5	1.8	NA	NA	NA	NA	Color degree
Carameliza	180	3.0	2.8	NA	NA	NA	NA	Color degree
Contest-S	5	175.0	318.0	217.0	265.0	158.0	181.0	C/F Grade
Contest-S	15	157.0	252.0	363.0	180.0	208.0	343.0	C/F Grade
Contest-S	25	196.0	177.0	182.0	173.0	260.0	349.0	C/F Grade
Contest-S	35	107.0	110.0	163.0	188.0	215.0	157.0	C/F Grade
Contest-S	115	309.0	465.0	242.0	305.0	417.0	228.0	C/F Grade
Contest-S	135	97.0	157.0	235.0	160.0	237.0	241.0	C/F Grade
Contest-S	155	284.0	334.0	369.0	274.0	364.0	286.0	C/F Grade
Contest-S	170	335.0	336.0	314.0	429.0	379.0	NA	C/F Grade
H2SD	30	27.0	17.0	13.0	15.0	20.0	19.0	Sticky point
H2SD	55	28.0	20.0	19.0	18.0	21.0	22.0	Sticky point
H2SD	70	32.0	27.0	18.0	11.0	11.0	13.0	Sticky point
H2SD	85	28.0	24.0	26.0	27.0	17.0	19.0	Sticky point
H2SD	95	14.0	12.0	26.0	13.0	12.0	14.0	Sticky point
H2SD	110	22.0	19.0	16.0	24.0	16.0	18.0	Sticky point
H2SD	150	29.0	10.0	22.0	31.0	17.0	23.0	Sticky point
H2SD	165	33.0	24.0	21.0	22.0	21.0	33.0	Sticky point
KOTITI	75	8.0	8.0	8.0	8.0	8.0	8.0	KOTITI Grade
Minicard	45	2.0	2.0	3.0	NA	NA	NA	ITMF grade
MinicardC	140	5.0	5.0	6.0	NA	NA	NA	Cirad grade
Qualitativ	130	2.0	2.0	2.0	2.0	2.0	2.0	Grade
Quantitati	10	0.5	0.5	0.7	0.4	0.5	0.4	Percent
Quantitati	80	0.1	0.2	0.1	0.1	0.1	0.1	Percent
SCT	20	21.0	32.0	24.0	NA	NA	NA	Sticky point
SCT	50	43.0	29.0	36.0	31.0	58.0	32.0	Sticky point
SCT	60	32.0	58.0	42.0	NA	NA	NA	Sticky point
SCT	65	14.0	20.0	23.0	NA	NA	NA	Sticky point
SCT	90	18.0	19.0	16.0	16.0	19.0	12.0	Sticky point
SCT	100	30.0	32.0	30.0	NA	NA	NA	Sticky point
SCT	120	43.0	48.0	44.0	NA	NA	NA	Sticky point
SCT	125	72.0	51.0	51.0	NA	NA	NA	Sticky point
SCT	145	21.0	22.0	20.0	19.0	17.0	20.0	Sticky point
SCT	160	57.0	61.0	52.0	NA	NA	NA	Sticky point

Statistics per Method, LabID for each cottons ²

²Footnote

- * Mean of all readings per LabID (NA excluded, expressed in Unit).
- * Var = variance taking care of all available readings per LabID (NA excluded).
- * CV = CV between reading per LabID expressed in percent.
- * GMean = Grand Mean of all laboratory means, calculated by Method.
- * Delta = LabID Mean - GMean.
- * NA or NaN : no result provided.

Table for Cotton A

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	40	2.8	Color degree	NA	NA	2.5	0.3
Carameliza	105	2.0	Color degree	0.1	18.1	2.5	-0.6
Carameliza	180	2.9	Color degree	0.1	12.4	2.5	0.3
Contest-S	5	333.8	C/F Grade	3743.8	18.3	414.8	-80.9
Contest-S	15	451.5	C/F Grade	7398.3	19.1	414.8	36.8
Contest-S	25	451.0	C/F Grade	11016.0	23.3	414.8	36.2
Contest-S	35	417.3	C/F Grade	2794.3	12.7	414.8	2.6
Contest-S	115	385.0	C/F Grade	13398.5	30.1	414.8	-29.8
Contest-S	135	366.8	C/F Grade	2555.8	13.8	414.8	-47.9
Contest-S	155	483.7	C/F Grade	1261.9	7.3	414.8	68.9
Contest-S	170	428.8	C/F Grade	5856.2	17.8	414.8	14.1
H2SD	30	34.0	Sticky point	189.6	40.5	37.8	-3.8
H2SD	55	49.3	Sticky point	119.9	22.2	37.8	11.5
H2SD	70	37.8	Sticky point	110.6	27.8	37.8	0.0
H2SD	85	37.0	Sticky point	232.4	41.2	37.8	-0.8
H2SD	95	34.7	Sticky point	58.7	22.1	37.8	-3.2
H2SD	110	24.3	Sticky point	21.1	18.9	37.8	-13.5
H2SD	150	44.3	Sticky point	35.9	13.5	37.8	6.5
H2SD	165	41.2	Sticky point	74.2	20.9	37.8	3.3
KOTITI	75	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	45	2.7	ITMF grade	0.1	10.8	2.7	0.0
MinicardC	140	5.7	Cirad grade	0.1	5.1	5.7	0.0
Qualitativ	130	2.0	Grade	0.0	0.0	2.0	0.0
Quantitati	10	0.7	Percent	0.0	17.6	0.4	0.3
Quantitati	80	0.1	Percent	0.0	32.7	0.4	-0.3
SCT	20	68.3	Sticky point	92.3	14.1	61.5	6.8
SCT	50	35.0	Sticky point	14.0	10.7	61.5	-26.5
SCT	60	30.7	Sticky point	16.3	13.2	61.5	-30.8
SCT	65	64.7	Sticky point	74.3	13.3	61.5	3.2
SCT	90	44.3	Sticky point	21.1	10.4	61.5	-17.1
SCT	100	72.7	Sticky point	126.3	15.5	61.5	11.2
SCT	120	74.0	Sticky point	147.0	16.4	61.5	12.5
SCT	125	82.3	Sticky point	156.3	15.2	61.5	20.8
SCT	145	54.8	Sticky point	19.8	8.1	61.5	-6.6
SCT	160	88.0	Sticky point	196.0	15.9	61.5	26.5

Table for Cotton B

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	40	2.7	Color degree	NA	NA	2.3	0.4
Carameliza	105	1.6	Color degree	0.0	4.3	2.3	-0.7
Carameliza	180	2.6	Color degree	0.1	10.9	2.3	0.3
Contest-S	5	53.8	C/F Grade	200.6	26.3	82.6	-28.7
Contest-S	15	87.8	C/F Grade	501.4	25.5	82.6	5.3
Contest-S	25	55.8	C/F Grade	264.2	29.1	82.6	-26.7
Contest-S	35	47.2	C/F Grade	165.8	27.3	82.6	-35.4
Contest-S	115	99.0	C/F Grade	1238.8	35.6	82.6	16.4
Contest-S	135	72.0	C/F Grade	176.8	18.5	82.6	-10.6
Contest-S	155	129.2	C/F Grade	2657.8	39.9	82.6	46.6
Contest-S	170	115.7	C/F Grade	677.1	22.5	82.6	33.1
H2SD	30	7.3	Sticky point	9.1	41.1	11.0	-3.7
H2SD	55	17.3	Sticky point	116.3	62.2	11.0	6.3
H2SD	70	17.3	Sticky point	28.7	30.9	11.0	6.3
H2SD	85	9.3	Sticky point	20.3	48.2	11.0	-1.7
H2SD	95	8.7	Sticky point	4.3	23.8	11.0	-2.4
H2SD	110	1.8	Sticky point	2.2	80.3	11.0	-9.2
H2SD	150	13.0	Sticky point	11.6	26.2	11.0	2.0
H2SD	165	13.5	Sticky point	9.1	22.3	11.0	2.5
KOTITI	75	4.5	KOTITI Grade	0.3	12.2	4.5	0.0
Minicard	45	0.6	ITMF grade	0.0	24.7	0.6	0.0
MinicardC	140	2.2	Cirad grade	0.1	13.3	2.2	0.0
Qualitativ	130	1.0	Grade	0.0	0.0	1.0	0.0
Quantitati	10	0.5	Percent	0.0	10.9	0.3	0.1
Quantitati	80	0.2	Percent	0.0	21.3	0.3	-0.1
SCT	20	9.3	Sticky point	33.3	61.9	14.3	-4.9
SCT	50	11.0	Sticky point	6.8	23.7	14.3	-3.3
SCT	60	8.0	Sticky point	13.0	45.1	14.3	-6.3
SCT	65	7.3	Sticky point	6.3	34.3	14.3	-7.0
SCT	90	5.7	Sticky point	5.5	41.3	14.3	-8.6
SCT	100	21.7	Sticky point	20.3	20.8	14.3	7.4
SCT	120	19.0	Sticky point	7.0	13.9	14.3	4.7
SCT	125	20.7	Sticky point	22.3	22.9	14.3	6.4
SCT	145	14.2	Sticky point	7.8	19.7	14.3	-0.1
SCT	160	26.0	Sticky point	13.0	13.9	14.3	11.7

Table for Cotton C

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	40	2.6	Color degree	NA	NA	2.2	0.4
Carameliza	105	1.5	Color degree	0.1	18.9	2.2	-0.7
Carameliza	180	2.5	Color degree	0.0	8.7	2.2	0.3
Contest-S	5	320.5	C/F Grade	3316.7	18.0	377.8	-57.3
Contest-S	15	429.8	C/F Grade	3545.0	13.9	377.8	52.0
Contest-S	25	403.2	C/F Grade	3071.4	13.7	377.8	25.3
Contest-S	35	286.7	C/F Grade	728.3	9.4	377.8	-91.2
Contest-S	115	390.0	C/F Grade	12282.0	28.4	377.8	12.2
Contest-S	135	306.5	C/F Grade	1831.5	14.0	377.8	-71.3
Contest-S	155	400.2	C/F Grade	3648.2	15.1	377.8	22.3
Contest-S	170	485.8	C/F Grade	4284.2	13.5	377.8	108.0
H2SD	30	41.2	Sticky point	74.2	20.9	35.6	5.5
H2SD	55	43.0	Sticky point	109.6	24.3	35.6	7.4
H2SD	70	36.2	Sticky point	75.8	24.1	35.6	0.5
H2SD	85	40.8	Sticky point	84.6	22.5	35.6	5.2
H2SD	95	15.7	Sticky point	11.9	22.0	35.6	-20.0
H2SD	110	35.3	Sticky point	31.9	16.0	35.6	-0.3
H2SD	150	40.5	Sticky point	304.3	43.1	35.6	4.9
H2SD	165	32.3	Sticky point	61.9	24.3	35.6	-3.3
KOTITI	75	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	45	1.8	ITMF grade	0.1	14.3	1.8	0.0
MinicardC	140	4.5	Cirad grade	0.2	11.1	4.5	0.0
Qualitativ	130	1.0	Grade	0.0	0.0	1.0	0.0
Quantitati	10	0.4	Percent	0.0	25.8	0.3	0.2
Quantitati	80	0.1	Percent	0.0	49.0	0.3	-0.2
SCT	20	62.3	Sticky point	116.3	17.3	60.9	1.4
SCT	50	34.3	Sticky point	63.5	23.2	60.9	-26.6
SCT	60	47.7	Sticky point	14.3	7.9	60.9	-13.3
SCT	65	65.3	Sticky point	225.3	23.0	60.9	4.4
SCT	90	51.3	Sticky point	57.9	14.8	60.9	-9.6
SCT	100	71.3	Sticky point	52.3	10.1	60.9	10.4
SCT	120	71.3	Sticky point	121.3	15.4	60.9	10.4
SCT	125	53.3	Sticky point	12.3	6.6	60.9	-7.6
SCT	145	44.3	Sticky point	9.1	6.8	60.9	-16.6
SCT	160	108.0	Sticky point	91.0	8.8	60.9	47.1

Table for Cotton D

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	40	2.6	Color degree	NA	NA	2.4	0.2
Carameliza	105	1.8	Color degree	0.0	7.9	2.4	-0.6
Carameliza	180	2.9	Color degree	0.1	9.8	2.4	0.5
Contest-S	5	304.3	C/F Grade	1485.9	12.7	381.8	-77.4
Contest-S	15	372.0	C/F Grade	1500.8	10.4	381.8	-9.8
Contest-S	25	419.5	C/F Grade	8381.9	21.8	381.8	37.7
Contest-S	35	322.3	C/F Grade	2918.3	16.8	381.8	-59.4
Contest-S	115	376.2	C/F Grade	6427.4	21.3	381.8	-5.6
Contest-S	135	334.0	C/F Grade	2972.4	16.3	381.8	-47.8
Contest-S	155	413.3	C/F Grade	3435.1	14.2	381.8	31.6
Contest-S	170	512.5	C/F Grade	9501.5	19.0	381.8	130.7
H2SD	30	25.8	Sticky point	41.4	24.9	24.1	1.7
H2SD	55	24.3	Sticky point	29.9	22.5	24.1	0.2
H2SD	70	27.7	Sticky point	48.7	25.2	24.1	3.5
H2SD	85	27.0	Sticky point	78.4	32.8	24.1	2.9
H2SD	95	18.7	Sticky point	25.9	27.2	24.1	-5.5
H2SD	110	4.7	Sticky point	3.9	42.1	24.1	-19.5
H2SD	150	34.2	Sticky point	127.0	33.0	24.1	10.0
H2SD	165	30.7	Sticky point	102.7	33.0	24.1	6.5
KOTITI	75	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	45	2.4	ITMF grade	0.4	26.0	2.4	0.0
MinicardC	140	5.5	Cirad grade	1.0	18.2	5.5	0.0
Qualitativ	130	1.0	Grade	0.0	0.0	1.0	0.0
Quantitati	10	0.4	Percent	0.0	15.4	0.3	0.1
Quantitati	80	0.1	Percent	0.0	32.7	0.3	-0.1
SCT	20	36.0	Sticky point	9.0	8.3	37.6	-1.6
SCT	50	31.5	Sticky point	85.9	29.4	37.6	-6.1
SCT	60	39.3	Sticky point	70.3	21.3	37.6	1.7
SCT	65	13.3	Sticky point	2.3	11.5	37.6	-24.3
SCT	90	26.8	Sticky point	5.4	8.6	37.6	-10.8
SCT	100	36.3	Sticky point	14.3	10.4	37.6	-1.3
SCT	120	40.0	Sticky point	63.0	19.8	37.6	2.4
SCT	125	27.7	Sticky point	16.3	14.6	37.6	-9.9
SCT	145	68.8	Sticky point	3.0	2.5	37.6	31.2
SCT	160	56.3	Sticky point	44.3	11.8	37.6	18.7

Table for Cotton E

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Carameliza	40	3.1	Color degree	NA	NA	2.7	0.4
Carameliza	105	2.1	Color degree	0.2	23.0	2.7	-0.6
Carameliza	180	2.9	Color degree	0.0	4.9	2.7	0.2
Contest-S	5	219.0	C/F Grade	3804.4	28.2	255.2	-36.2
Contest-S	15	250.5	C/F Grade	7346.7	34.2	255.2	-4.7
Contest-S	25	222.8	C/F Grade	4854.2	31.3	255.2	-32.4
Contest-S	35	156.7	C/F Grade	1813.9	27.2	255.2	-98.5
Contest-S	115	327.7	C/F Grade	8995.1	28.9	255.2	72.5
Contest-S	135	187.8	C/F Grade	3489.0	31.4	255.2	-67.4
Contest-S	155	318.5	C/F Grade	1817.5	13.4	255.2	63.3
Contest-S	170	358.6	C/F Grade	2107.3	12.8	255.2	103.4
H2SD	30	18.5	Sticky point	23.9	26.4	20.5	-2.0
H2SD	55	21.3	Sticky point	12.7	16.7	20.5	0.8
H2SD	70	18.7	Sticky point	79.5	47.8	20.5	-1.8
H2SD	85	23.5	Sticky point	20.3	19.2	20.5	3.0
H2SD	95	15.2	Sticky point	29.0	35.5	20.5	-5.3
H2SD	110	19.2	Sticky point	10.6	17.0	20.5	-1.3
H2SD	150	22.0	Sticky point	60.0	35.2	20.5	1.5
H2SD	165	25.7	Sticky point	33.5	22.5	20.5	5.2
KOTITI	75	8.0	KOTITI Grade	0.0	0.0	8.0	0.0
Minicard	45	2.3	ITMF grade	0.3	24.7	2.3	0.0
MinicardC	140	5.3	Cirad grade	0.3	10.8	5.3	0.0
Qualitativ	130	2.0	Grade	0.0	0.0	2.0	0.0
Quantitati	10	0.5	Percent	0.0	19.8	0.3	0.2
Quantitati	80	0.1	Percent	0.0	32.7	0.3	-0.2
SCT	20	25.7	Sticky point	32.3	22.2	35.4	-9.7
SCT	50	38.2	Sticky point	119.0	28.6	35.4	2.8
SCT	60	44.0	Sticky point	172.0	29.8	35.4	8.6
SCT	65	19.0	Sticky point	21.0	24.1	35.4	-16.4
SCT	90	16.7	Sticky point	7.1	15.9	35.4	-18.7
SCT	100	30.7	Sticky point	1.3	3.8	35.4	-4.7
SCT	120	45.0	Sticky point	7.0	5.9	35.4	9.6
SCT	125	58.0	Sticky point	147.0	20.9	35.4	22.6
SCT	145	19.8	Sticky point	3.0	8.7	35.4	-15.5
SCT	160	56.7	Sticky point	20.3	8.0	35.4	21.3

Data presented by boxplots per Method, LabID for each cotton ³

This section was appearing for the last time in RT2019-1 as the same information is given in the next section in a much more concise way; therefore next section only will remain in future reports from RT2019-2 on.

³Footnote

* NA excluded.

* In each box, the bolded line represents the median of all individual results for the considered LabID.

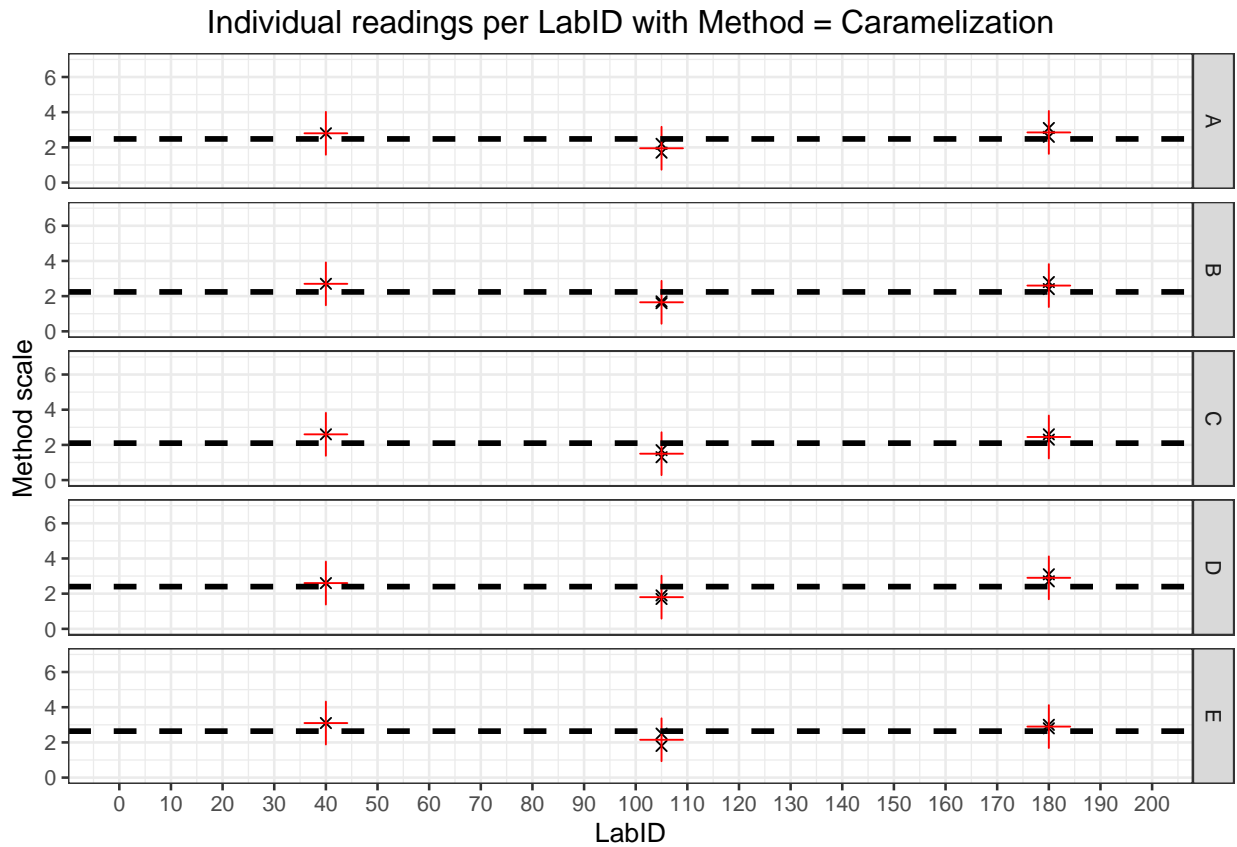
* The square represents the upper 75% (Q75) and lower 25% (Q25) percentiles of the individual results.

* The whiskers represent the quantiles that included in $\pm 1.5 * (Q75 - Q25)$.

* Extreme points may additionally be displayed by a point further out from the whiskers.

Charts of individual readings per Method and LabID for each cotton

4

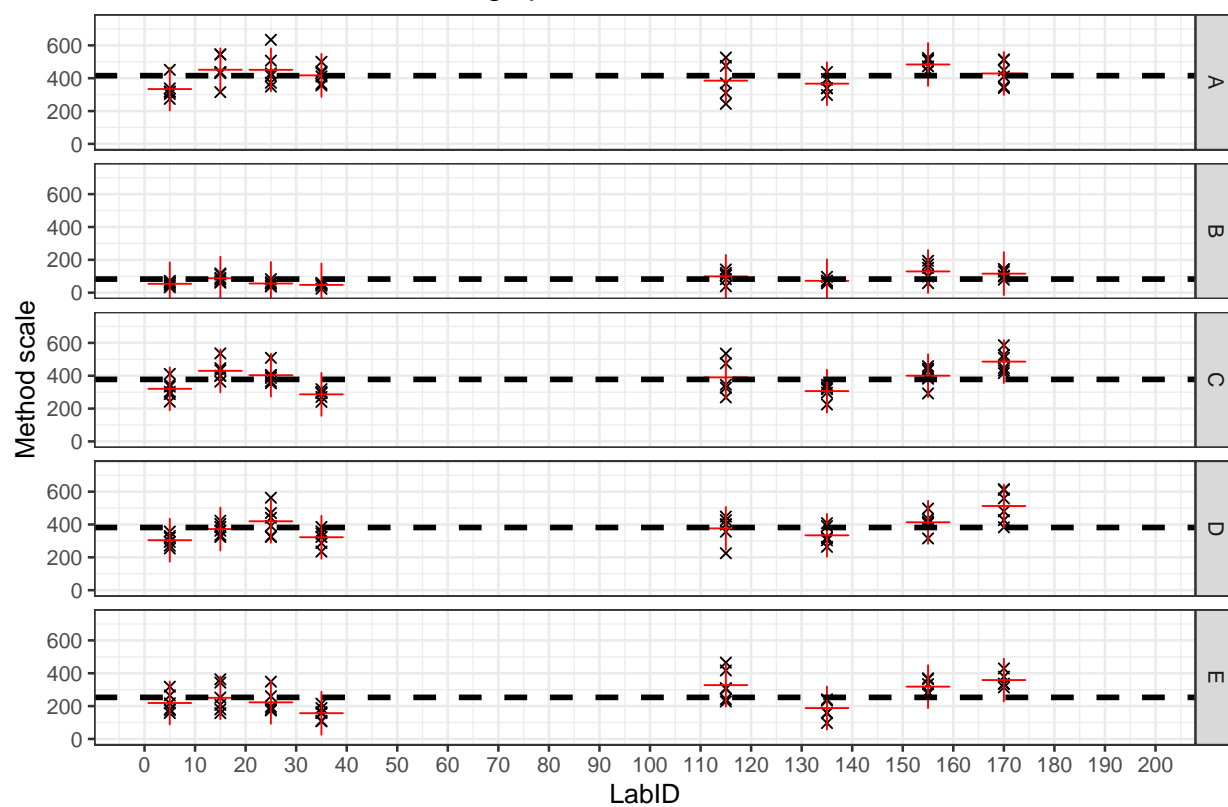


pdf 2

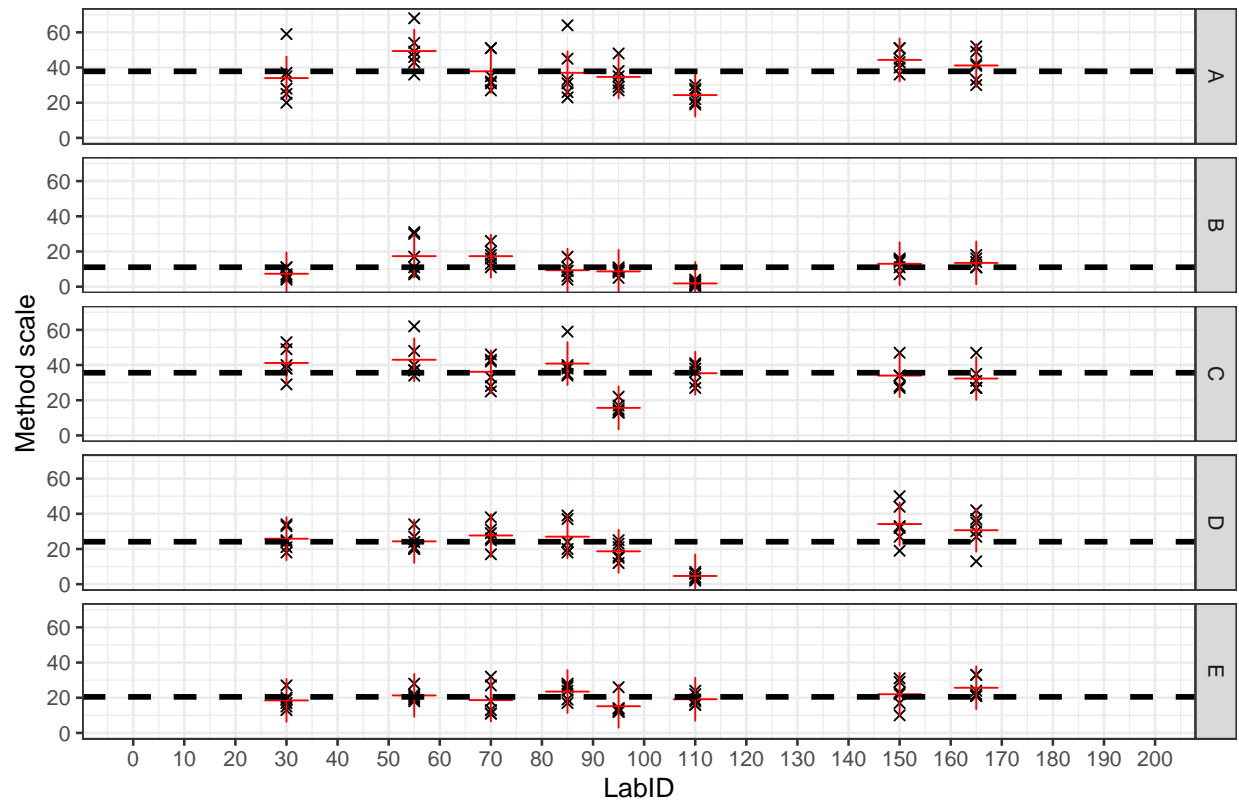
⁴Footnote

- * NA excluded
- * LabID are given in the abscissa axis at the bottom of the chart in the following charts.
- * Black dashed line = Method GrandMean per cotton.
- * Red + = Laboratory mean for the given method and for the given cotton.
- * Black x = Laboratory individual reading for the given method and for the given cotton.

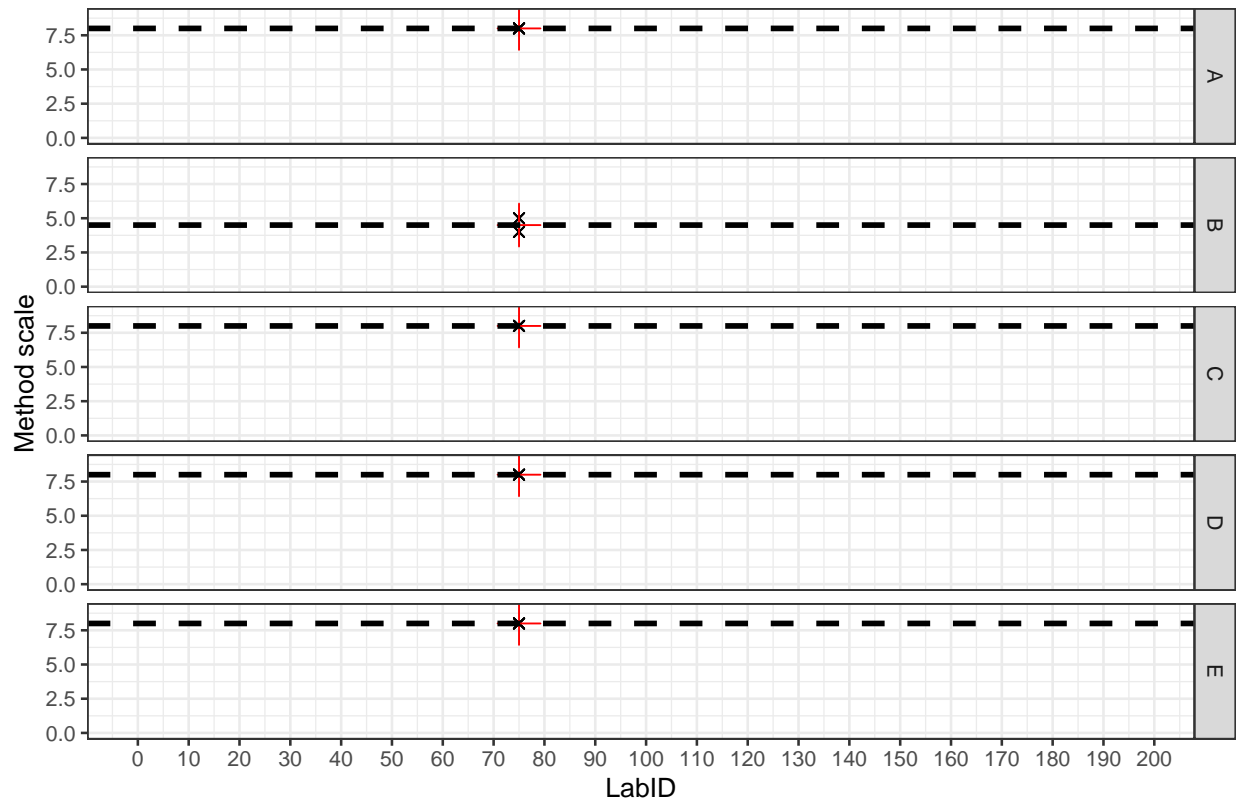
Individual readings per LabID with Method = Contest-S



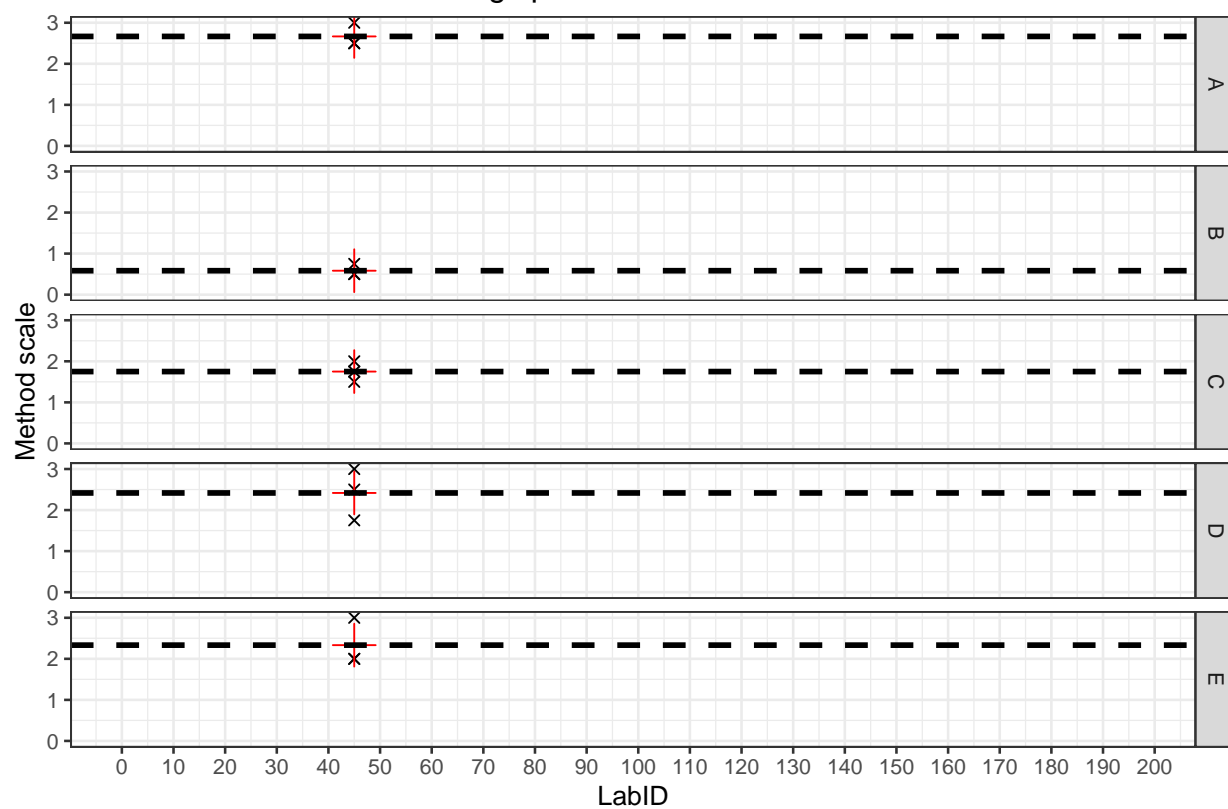
Individual readings per LabID with Method = H2SD



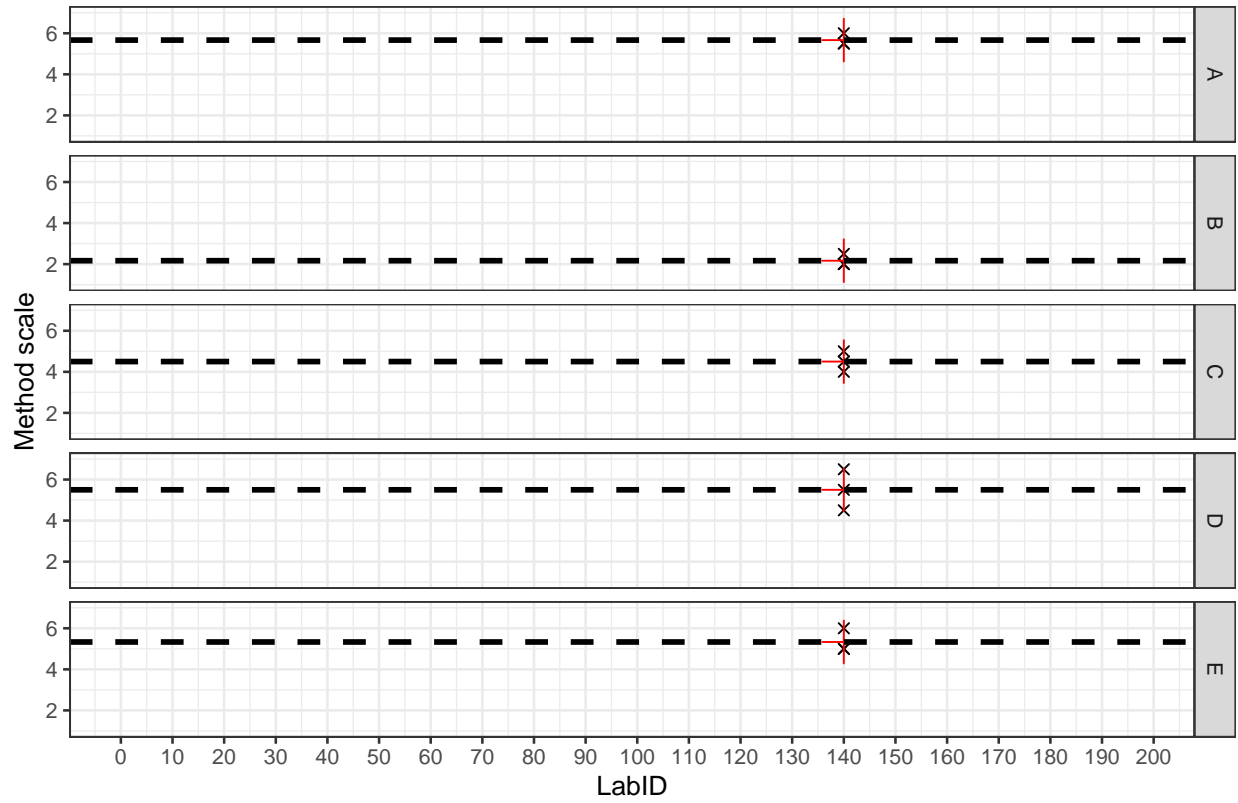
Individual readings per LabID with Method = KOTITI



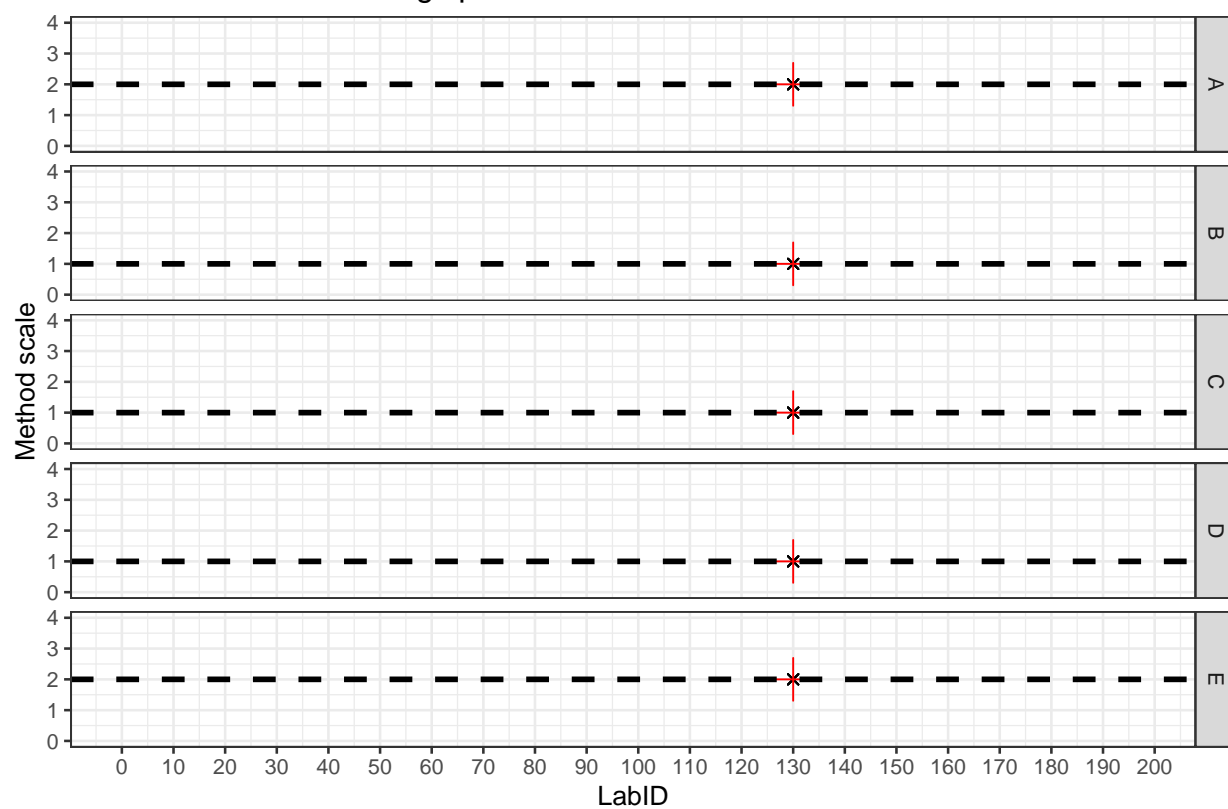
Individual readings per LabID with Method = Minicard

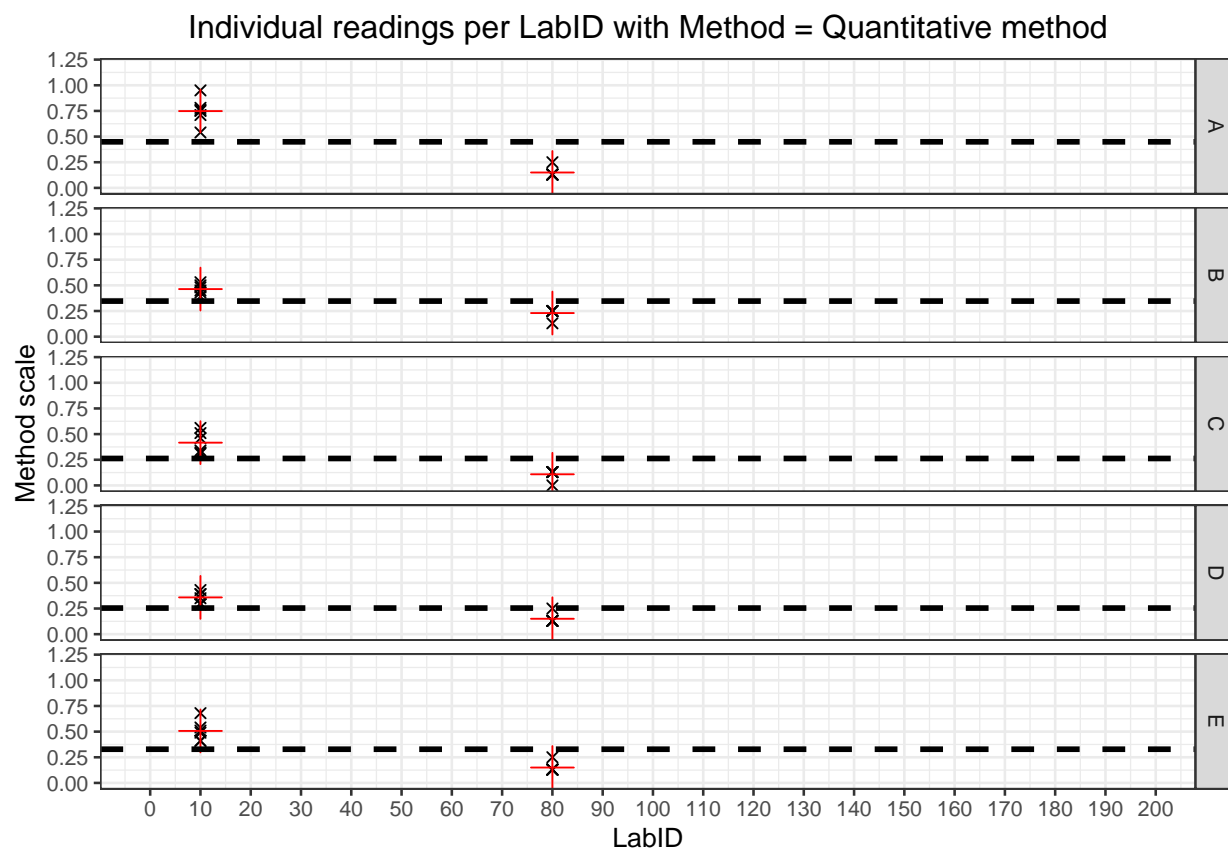


Individual readings per LabID with Method = MinicardC

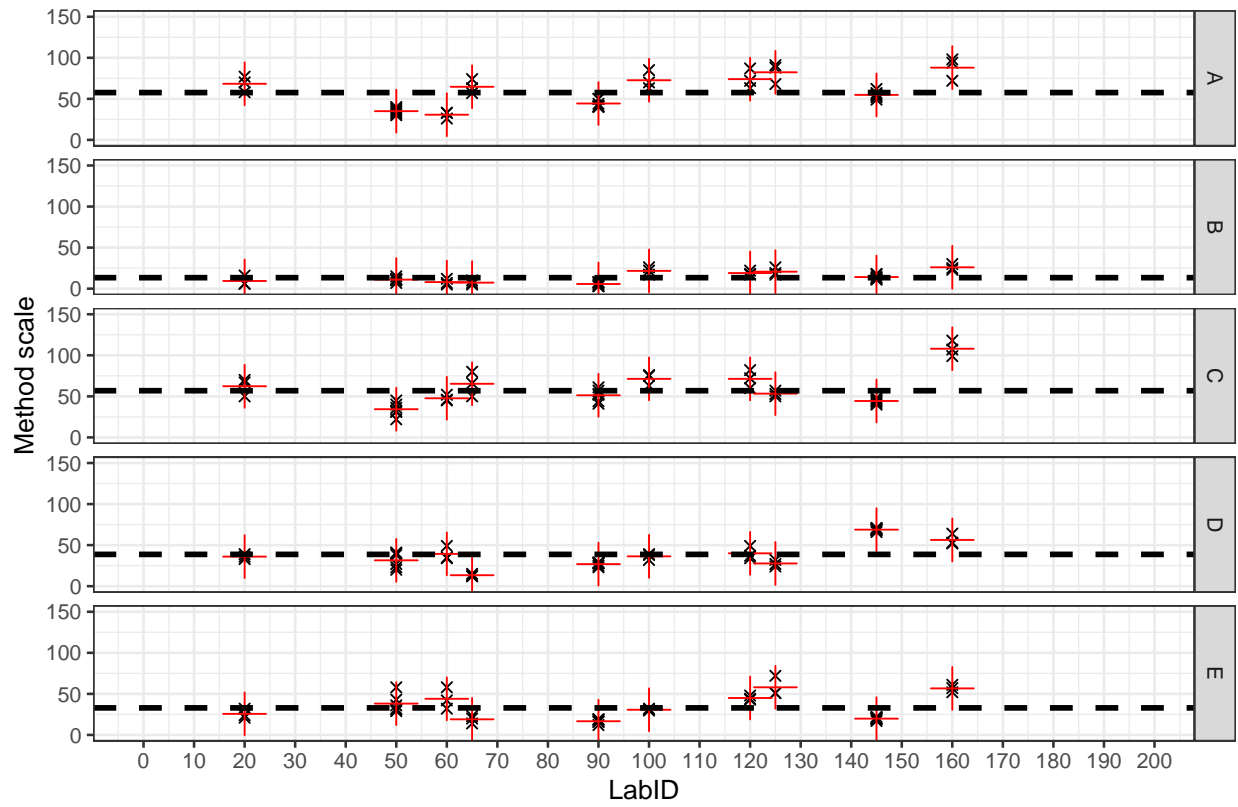


Individual readings per LabID with Method = Qualitative method



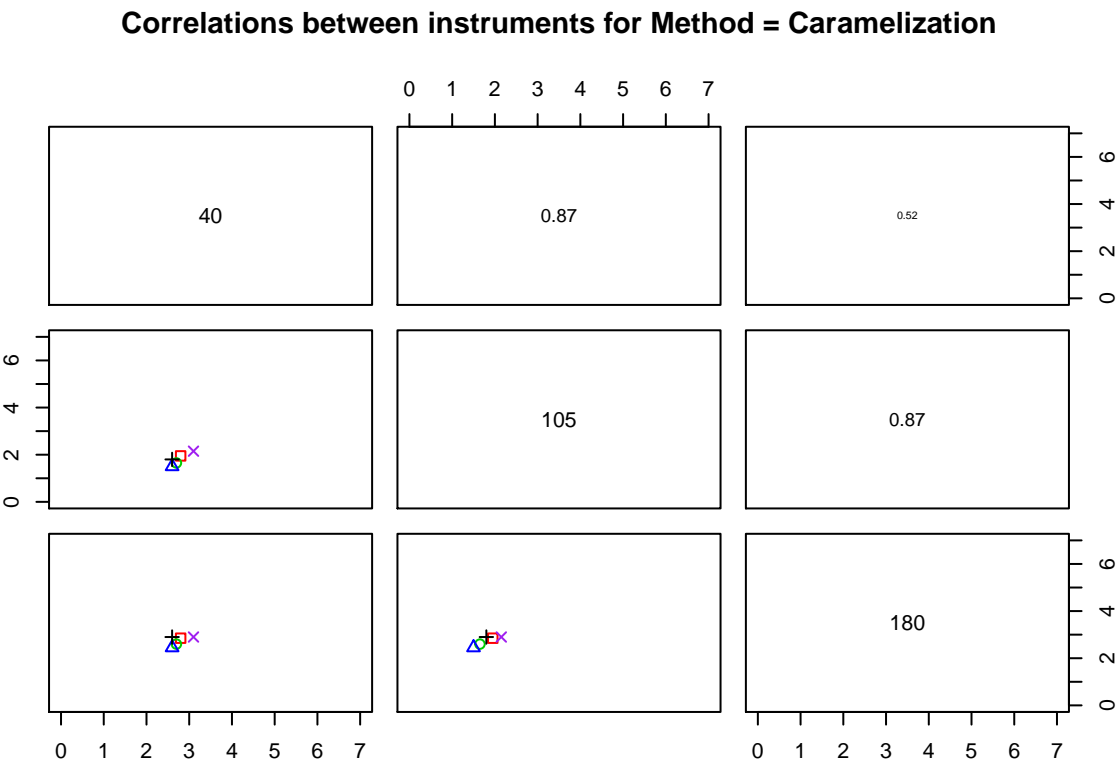


Individual readings per LabID with Method = SCT



Correlation charts and correlation values between LabID using a same Method for all cottons ⁵

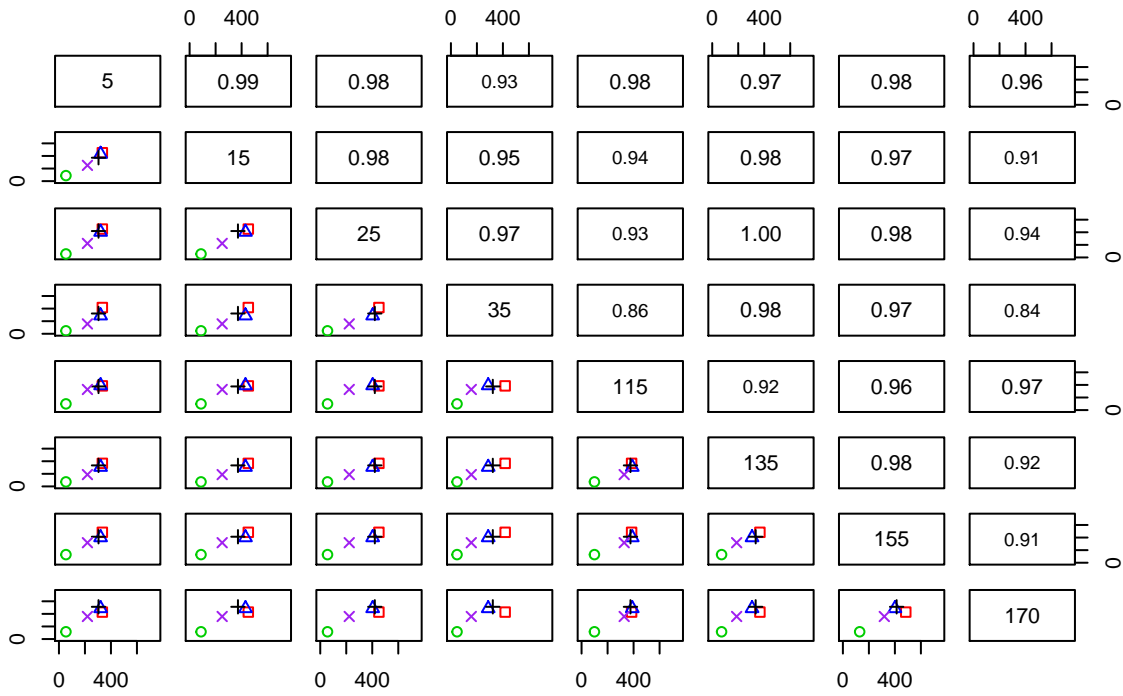
A correlation matrix of charts is provided only when two or more instruments were used for a given method.



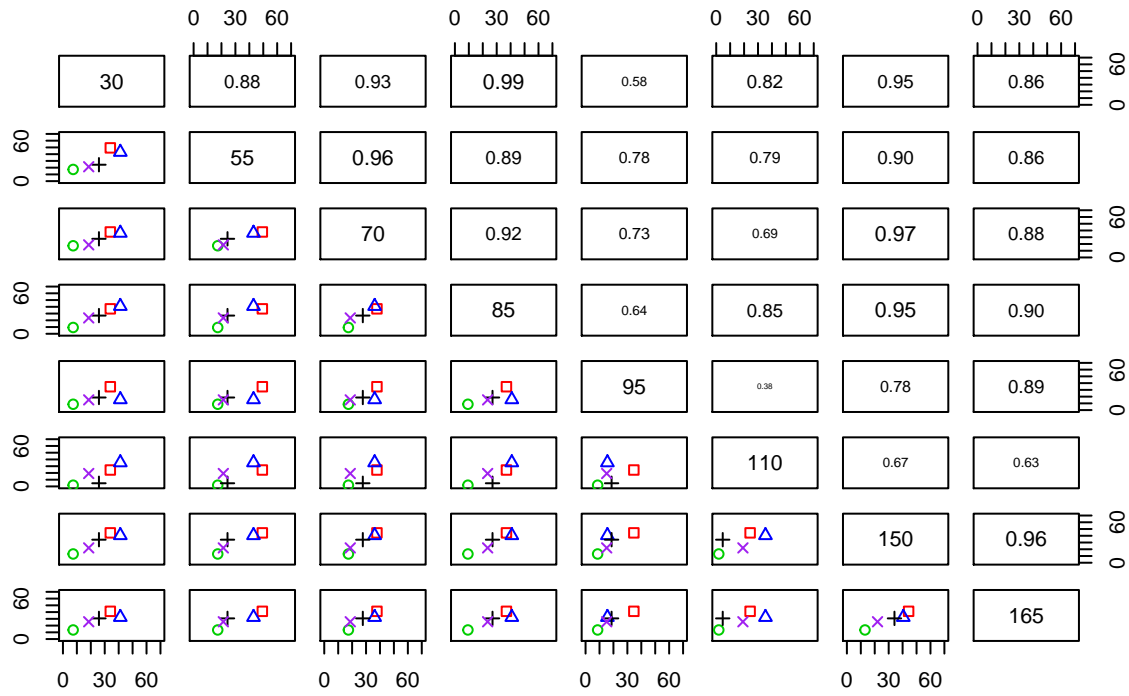
⁵Footnote

- * Based on Means of available results (NA excluded)
- * LabIDs are given in the diagonal of the matrix.
- * Squares in red for Cotton A, rounds in green for Cotton B, triangles in blue for Cotton C, + in black for cotton D, and x in purple for cotton E.
- * The lower left corner of the matrix provides the correlation charts, while the upper right corner of the matrix provides the corresponding raw correlation coefficients. Higher the correlation coefficient, larger the font size of the corresponding text.

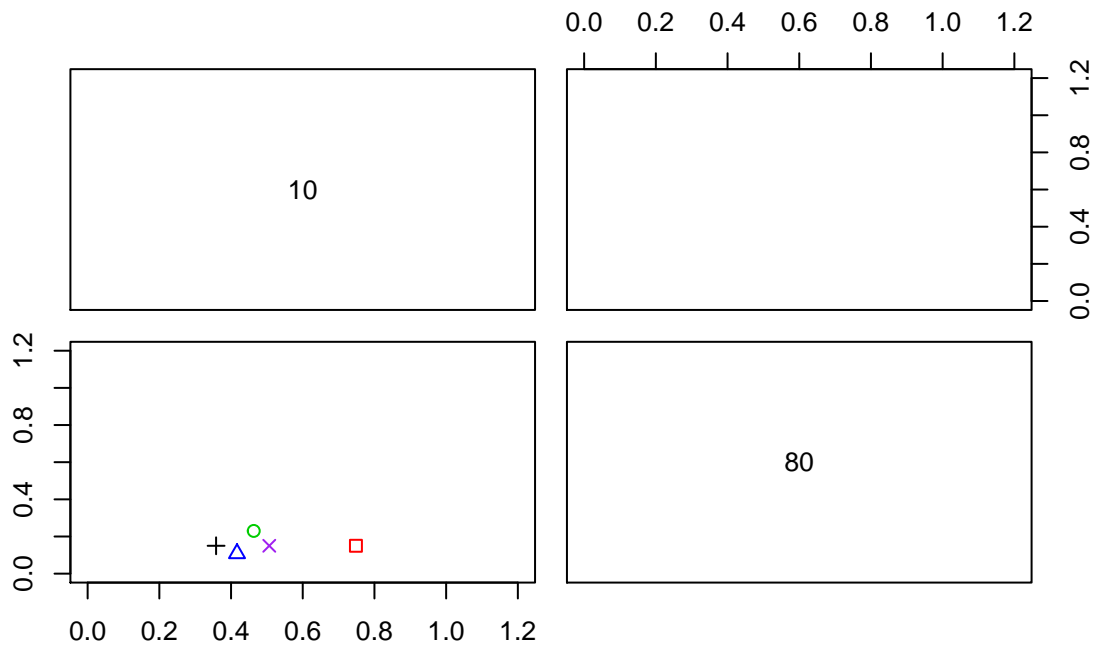
Correlations between instruments for Method = Contest-S



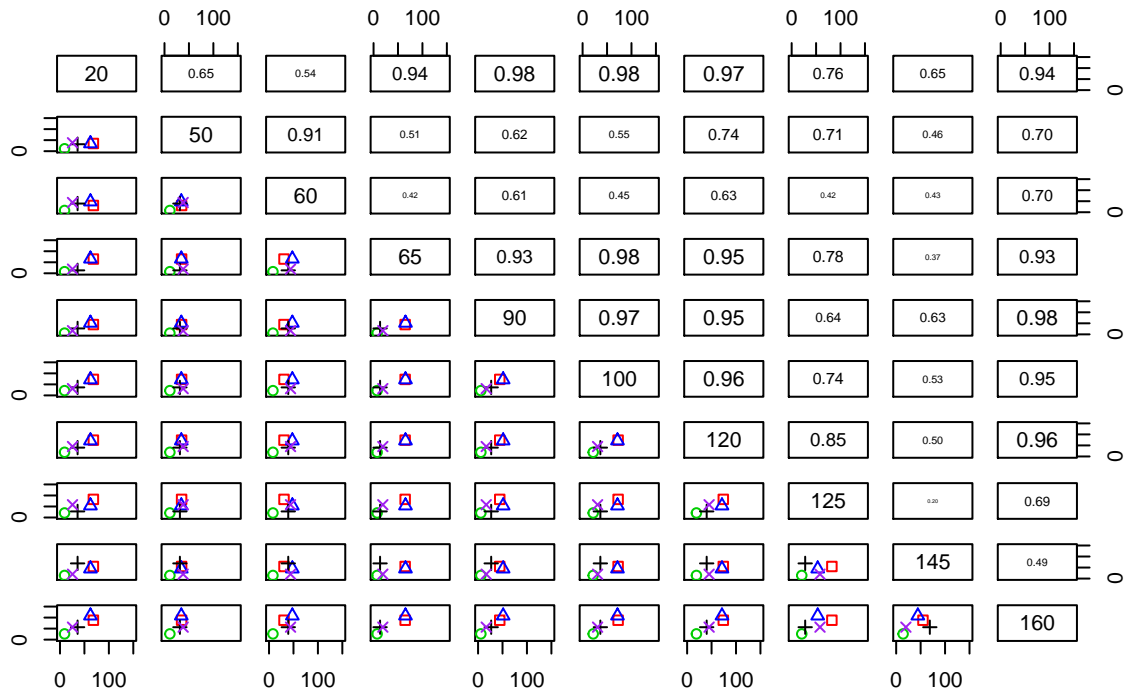
Correlations between instruments for Method = H2SD



Correlations between instruments for Method = Quantitative method



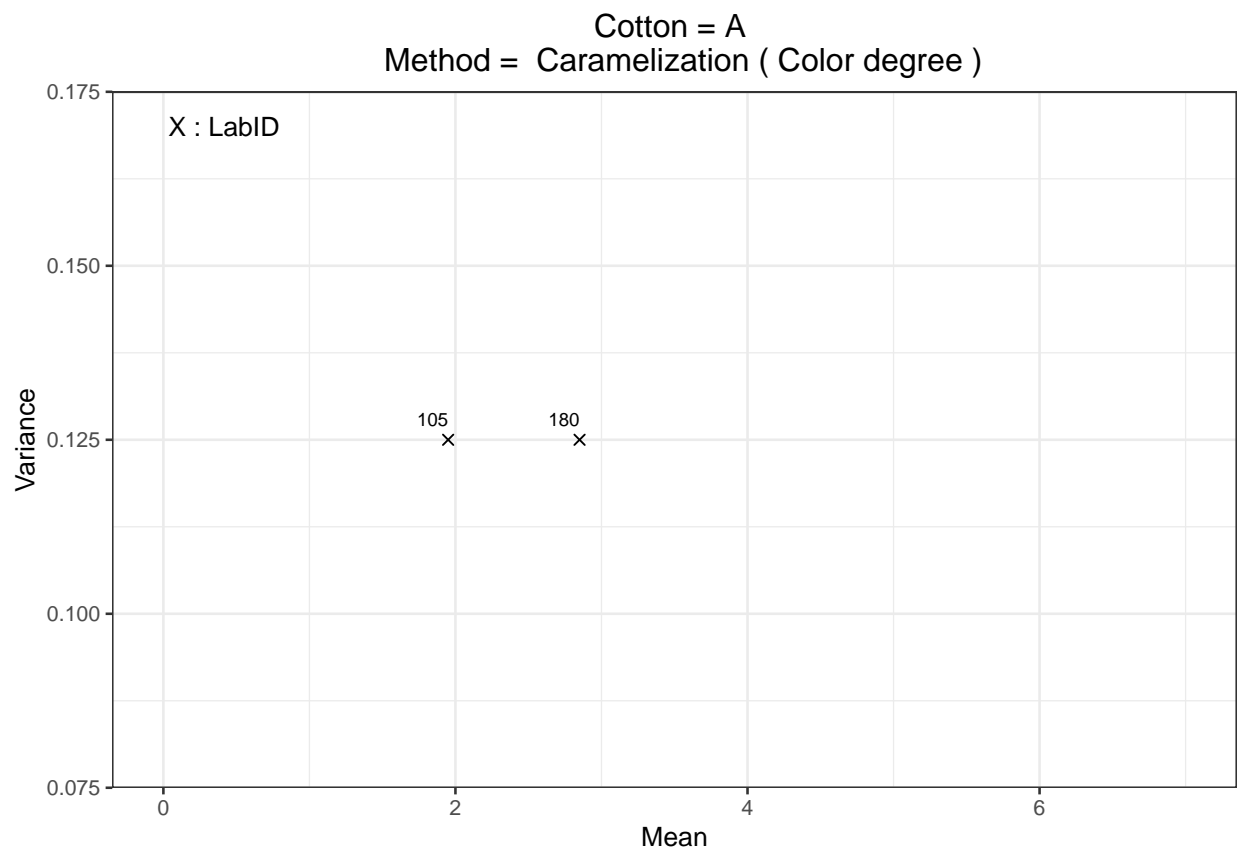
Correlations between instruments for Method = SCT



Charts Variance = $f(\text{Mean})$ for each Cotton and Method, taking care of LabIDs

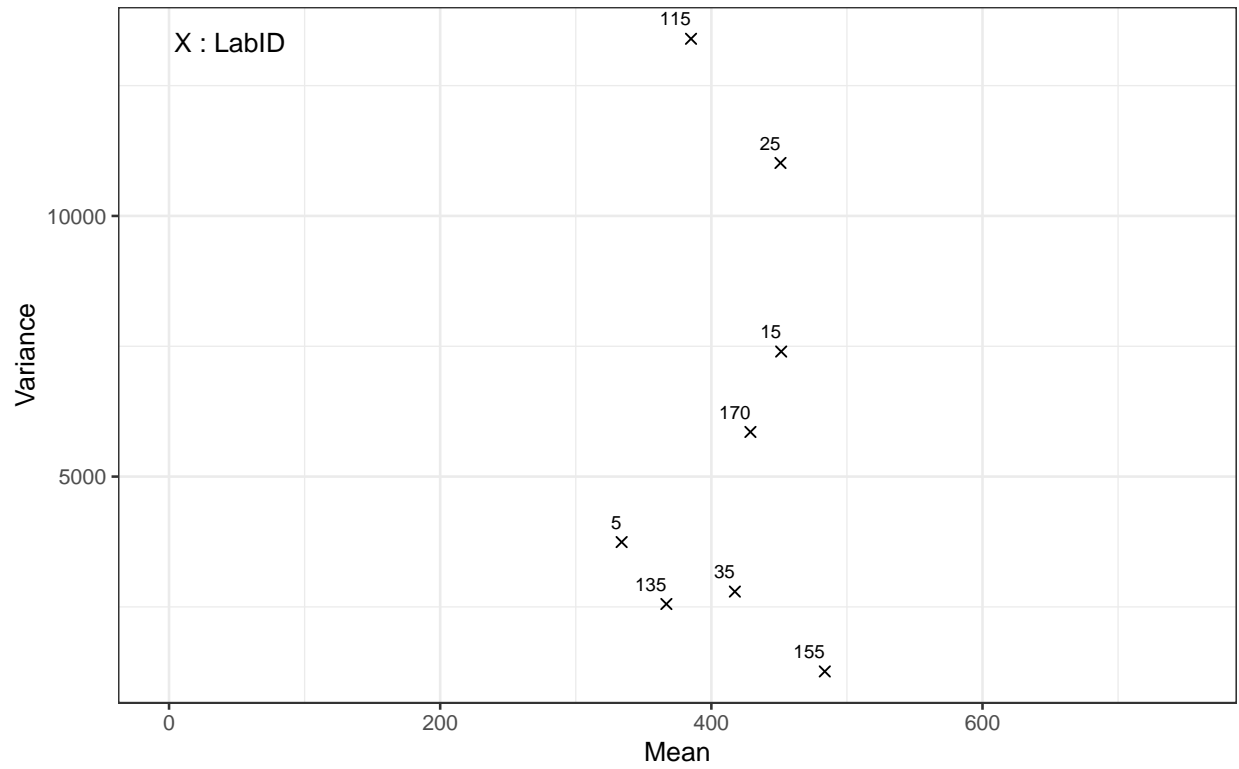
This type of chart is devoted to displaying the ability of laboratories to reproduce themselves for each cotton, based on the n readings (up to six) they provided for each cotton sample. Stickiness has the reputation to be heterogeneously distributed within samples (whatever the efforts we made for homogenizing cotton masses before dispatching representative samples); therefore, if methods are sensitive enough, then a certain level of variance (displayed on the vertical axis in the following charts) is to be seen when the number of measurements exceeds 1 in this test.

Cotton A : Variance between individual measurements = $f(\text{Mean})$ for all concerned labs

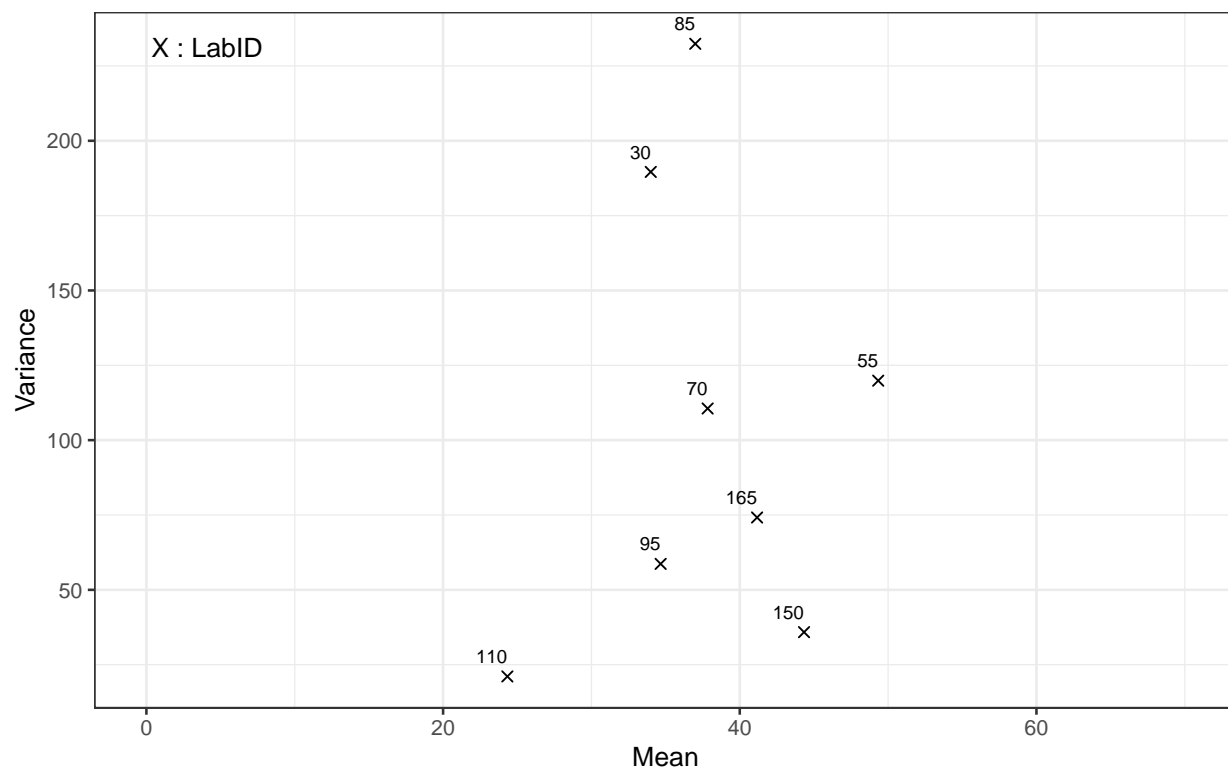


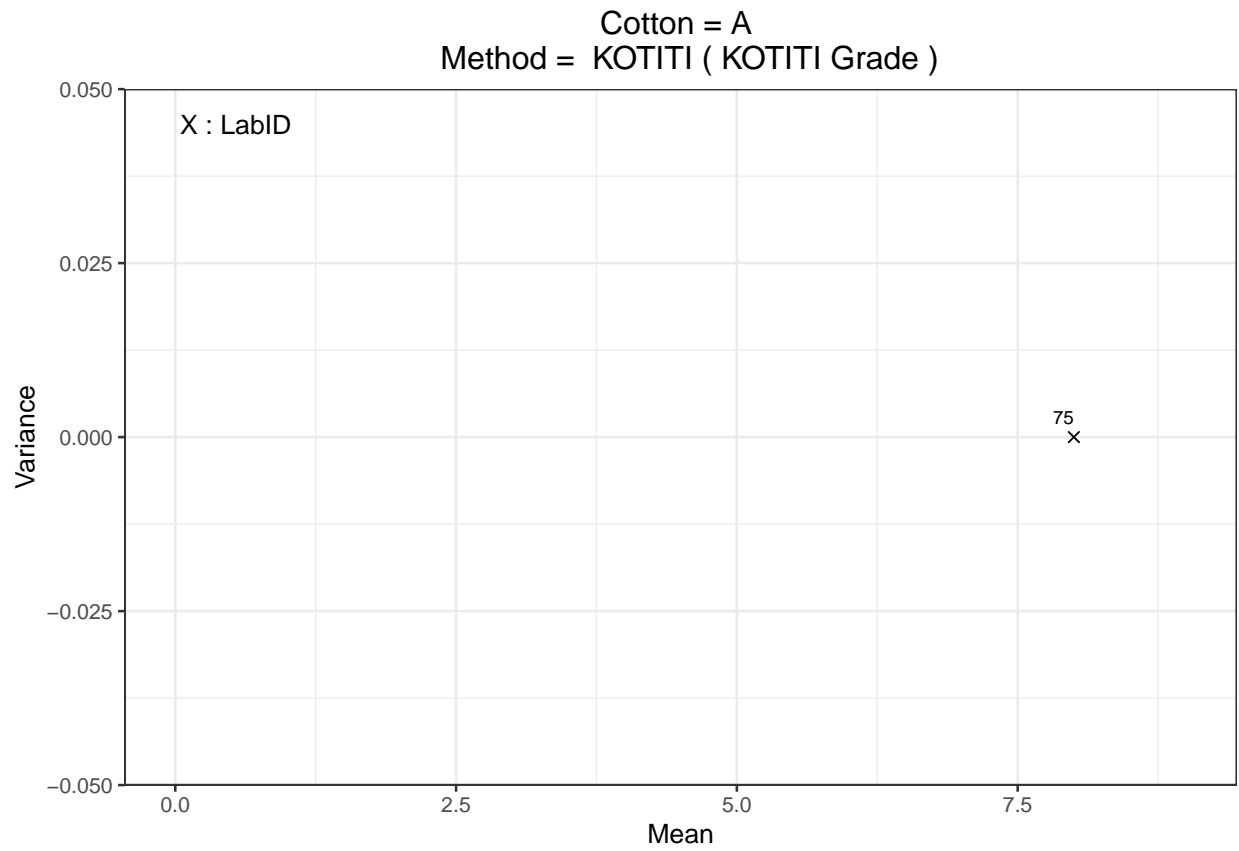
[1] “For Cotton = A and for method = Caramelization , 1 LabID (LabID being 40) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case.”

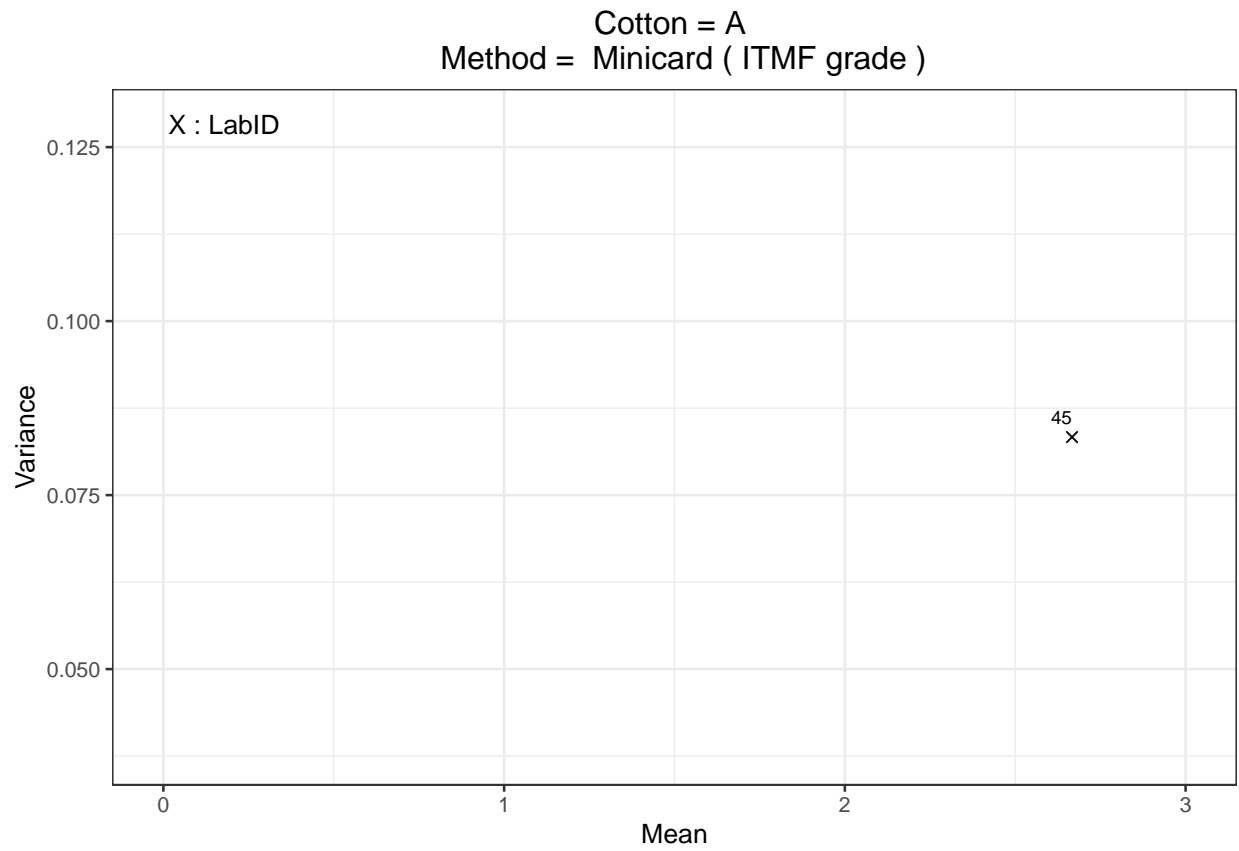
Cotton = A
Method = Contest-S (C/F Grade)

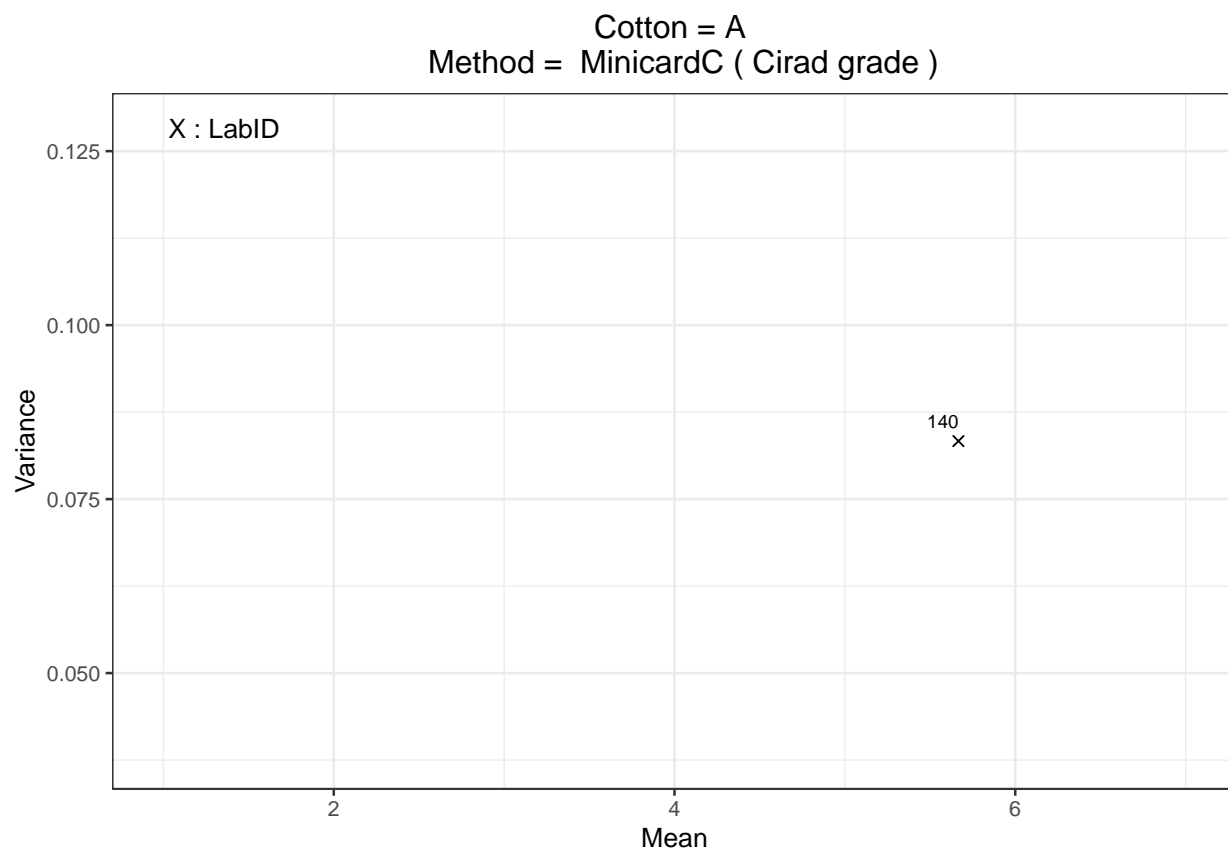


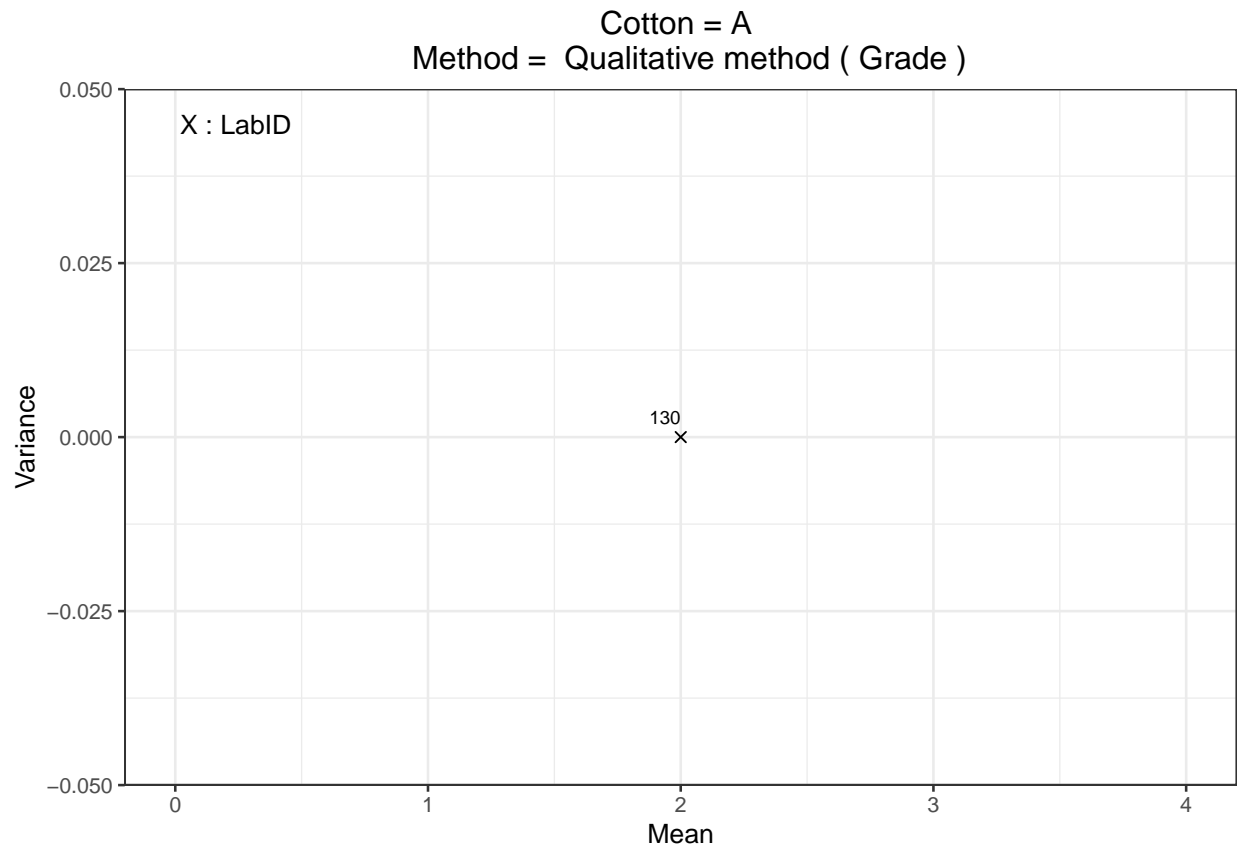
Cotton = A
Method = H2SD (Sticky points)

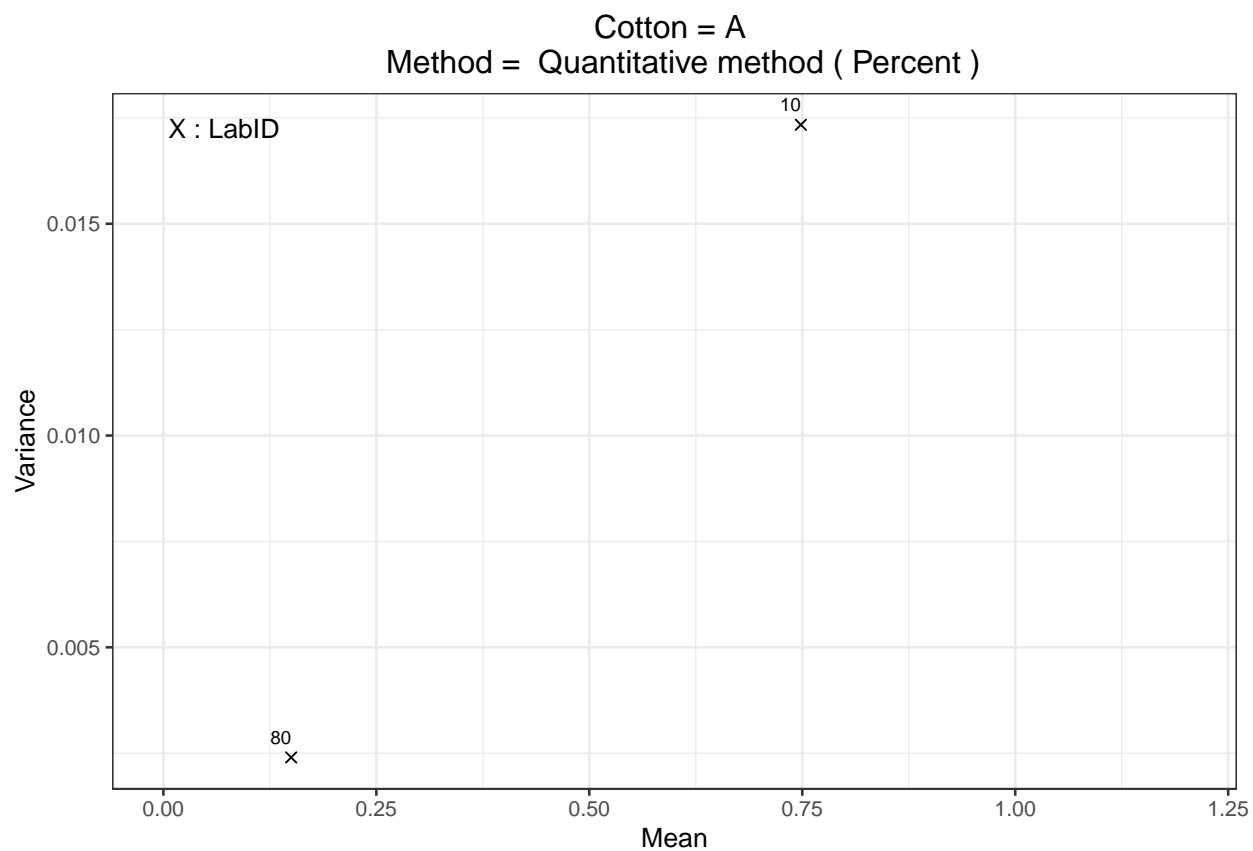


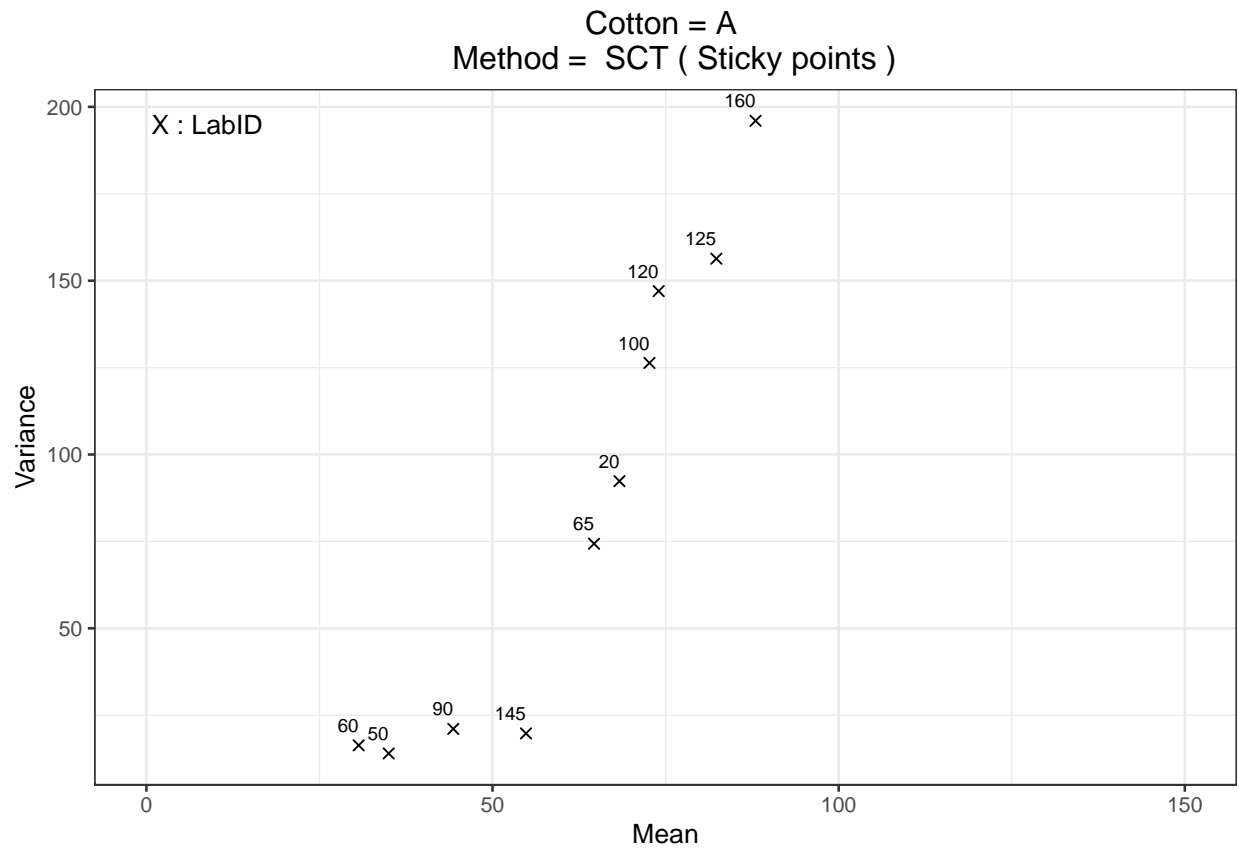




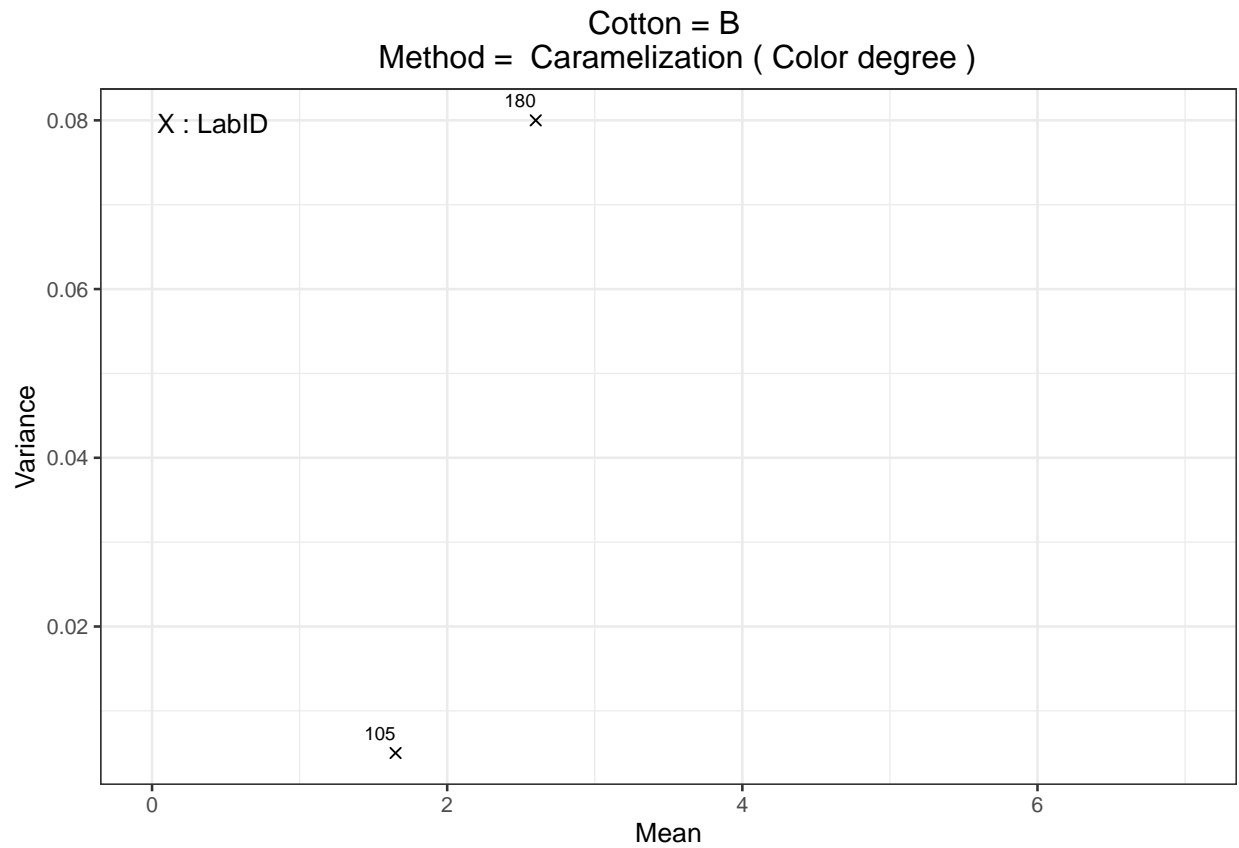




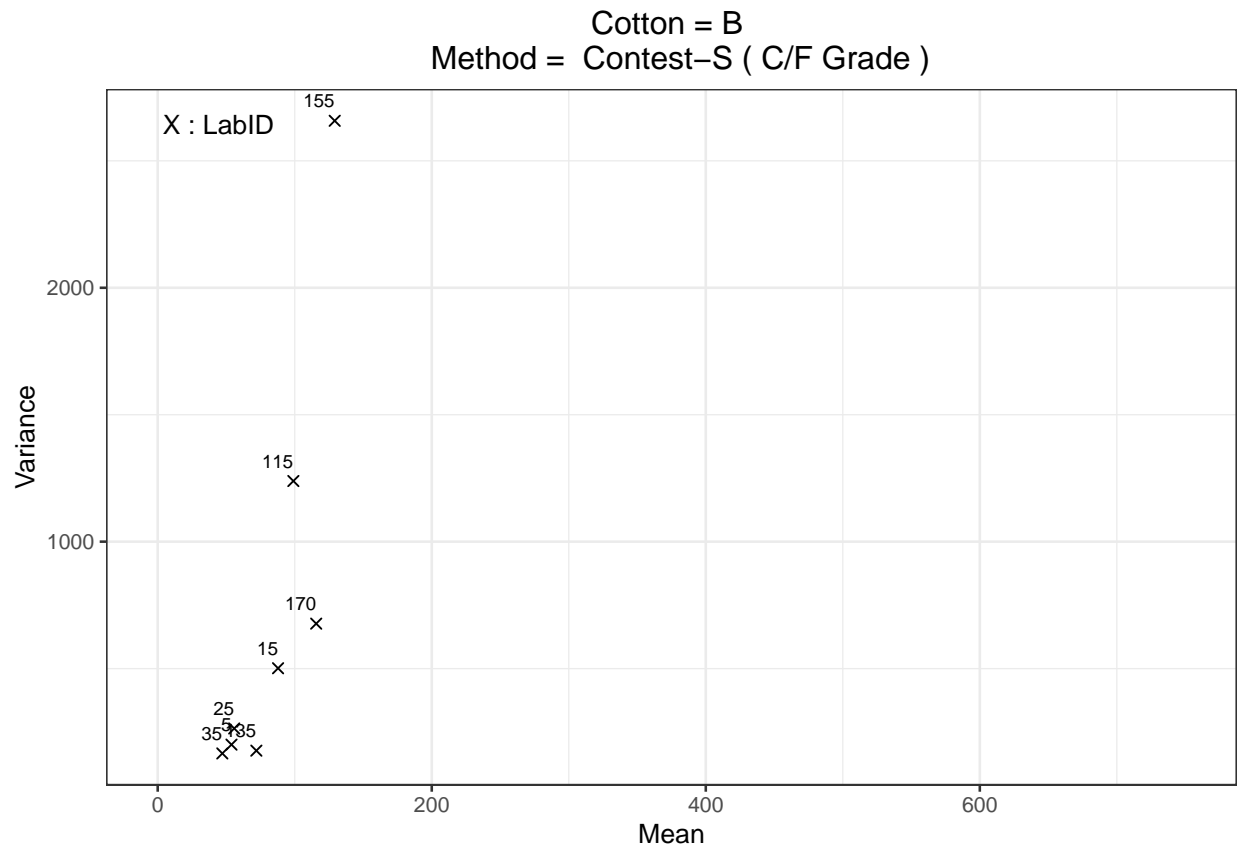


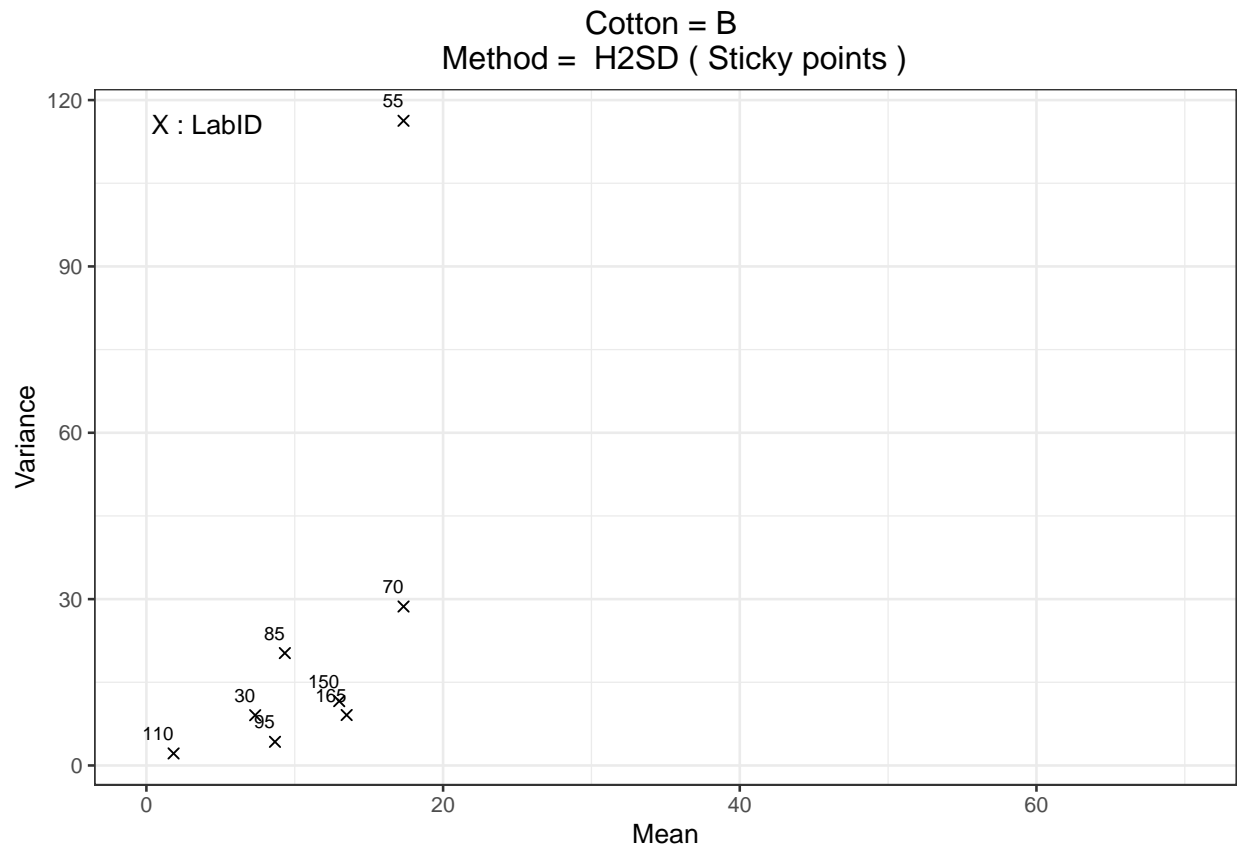


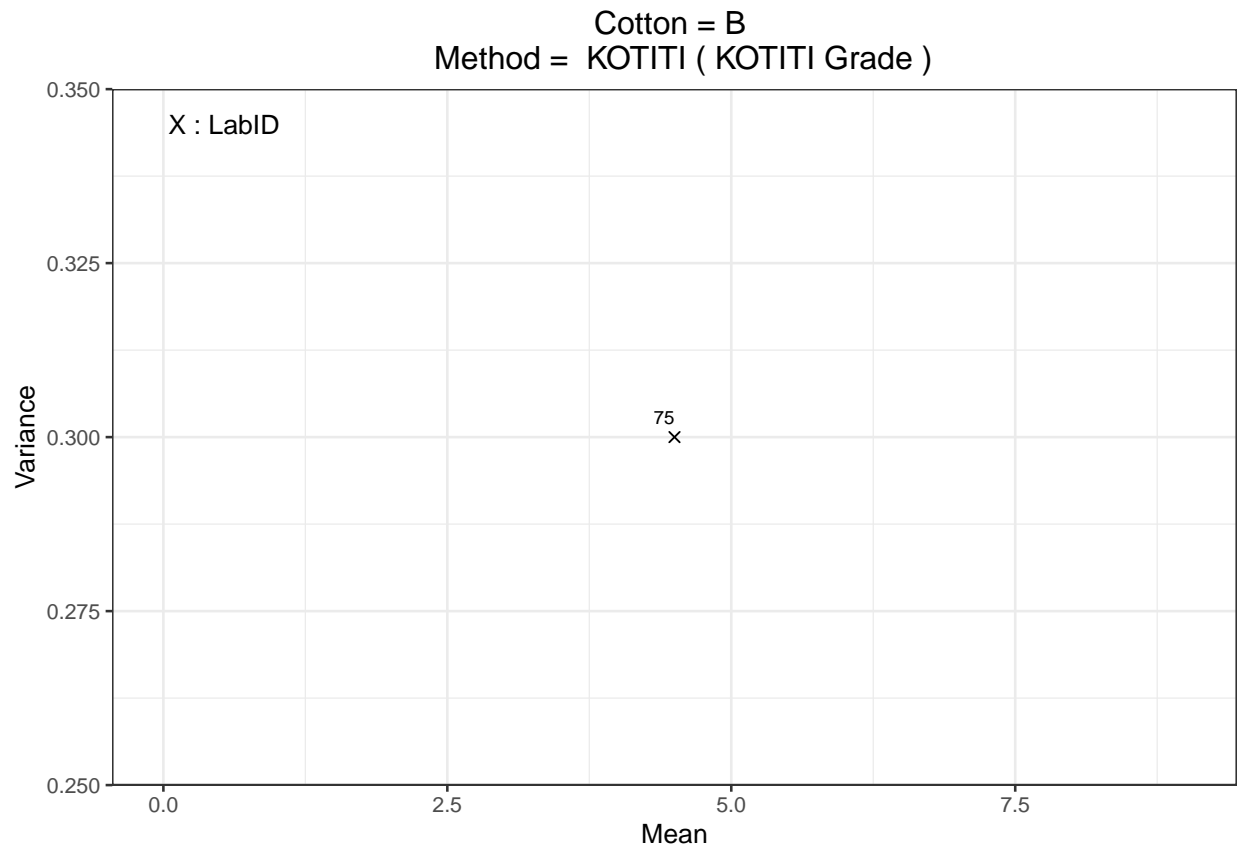
Cotton B : Variance between individual measurements = $f(\text{Mean})$ for all concerned labs

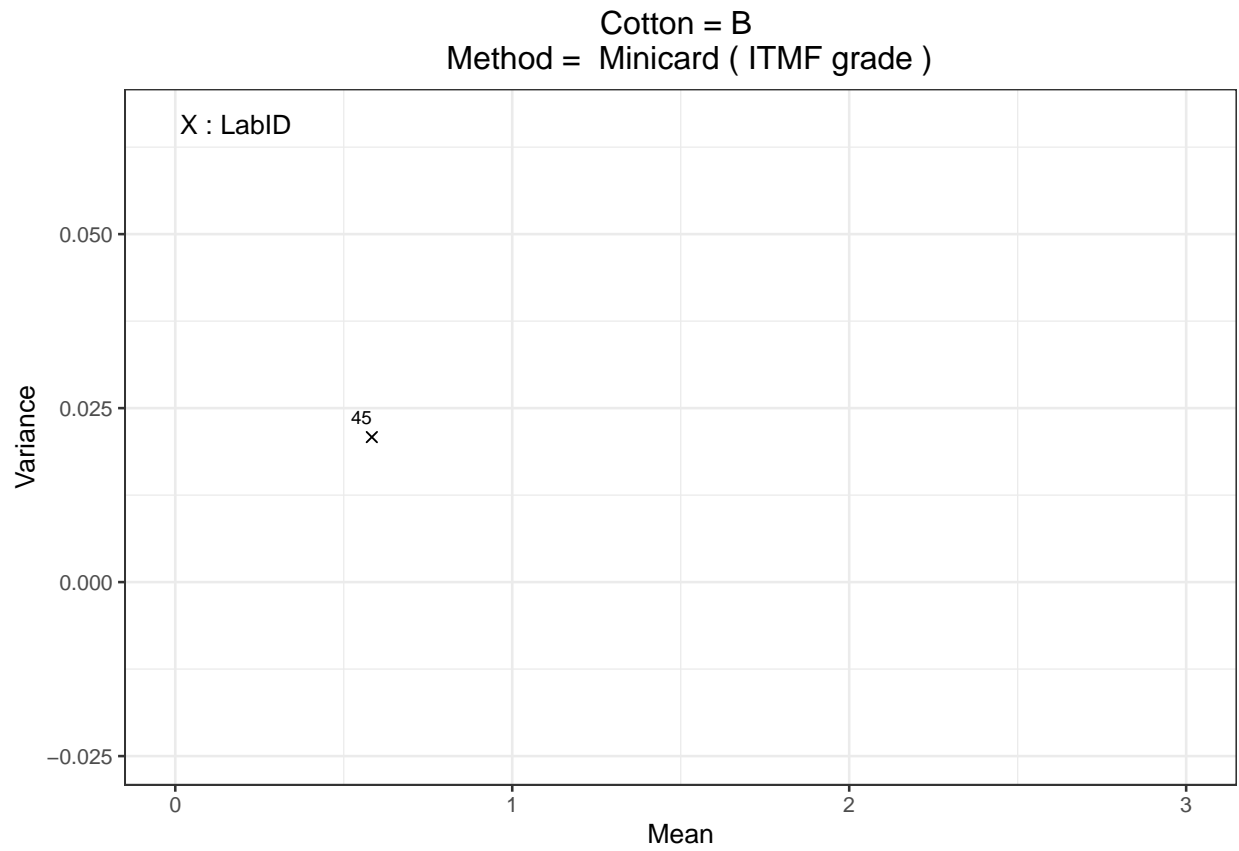


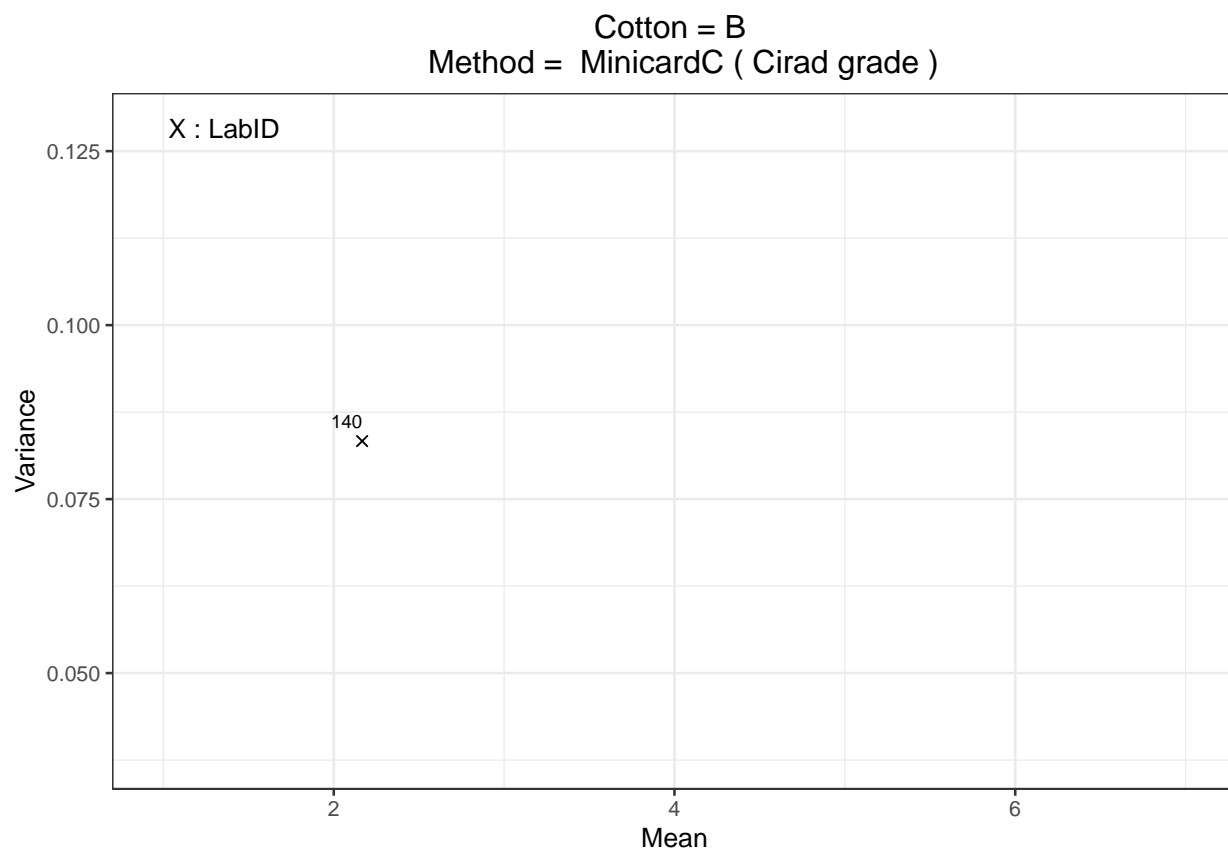
[1] “For Cotton = B and for method = Caramelization , 1 LabID (LabID being 40) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case.”

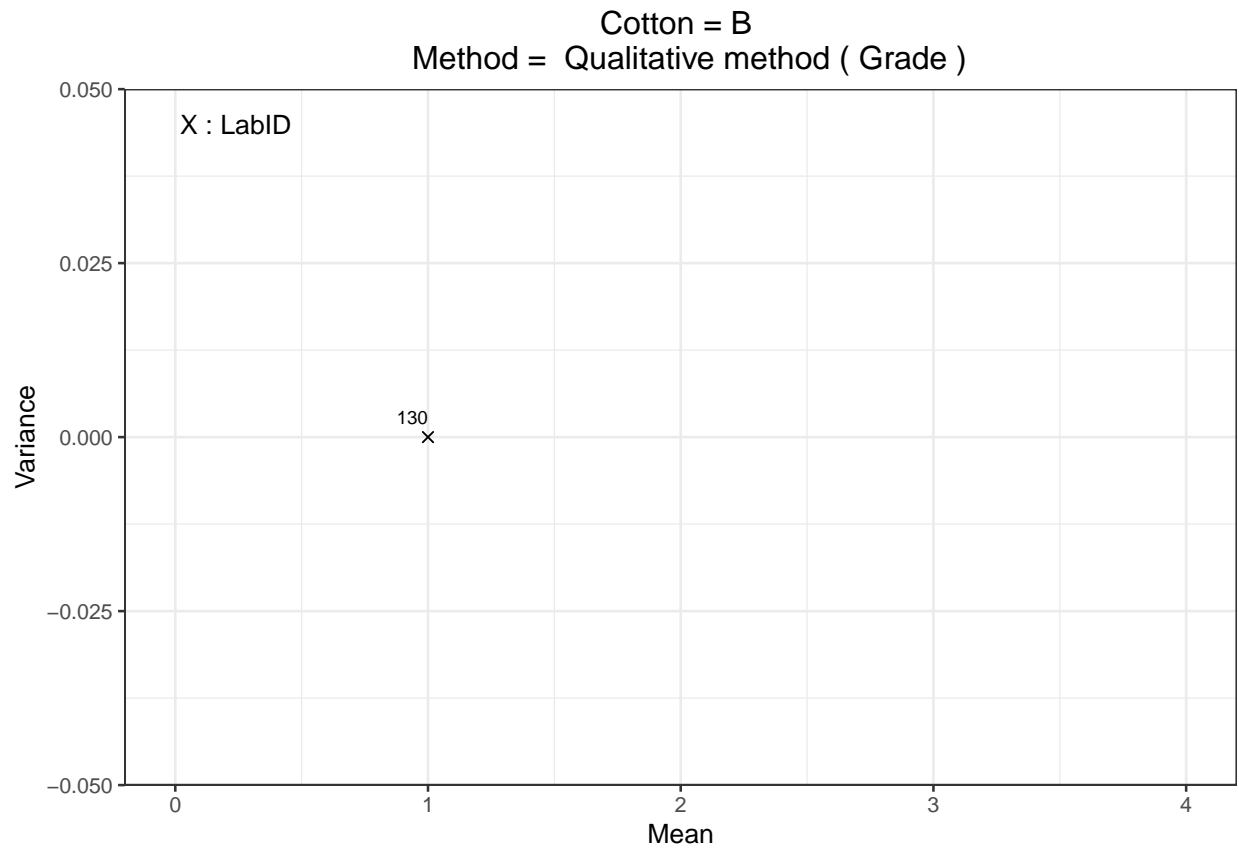


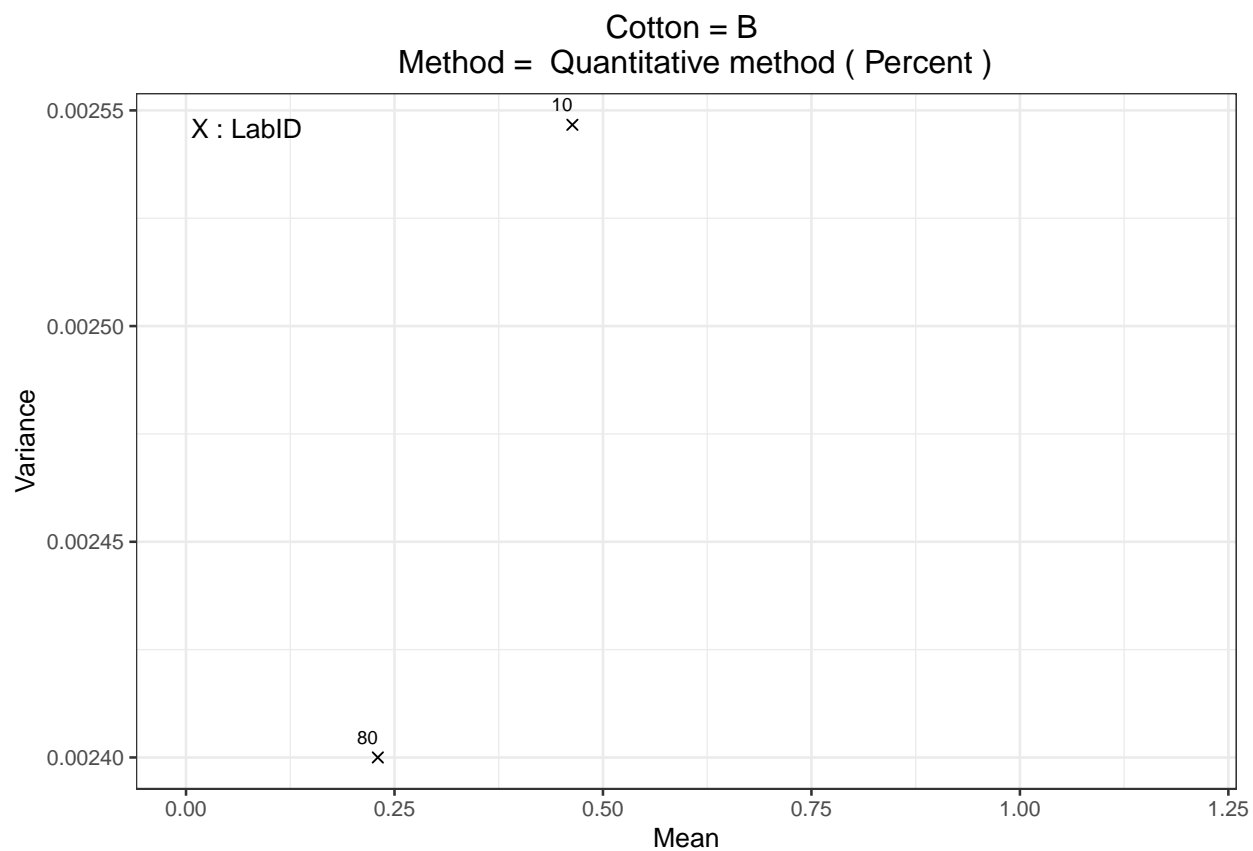




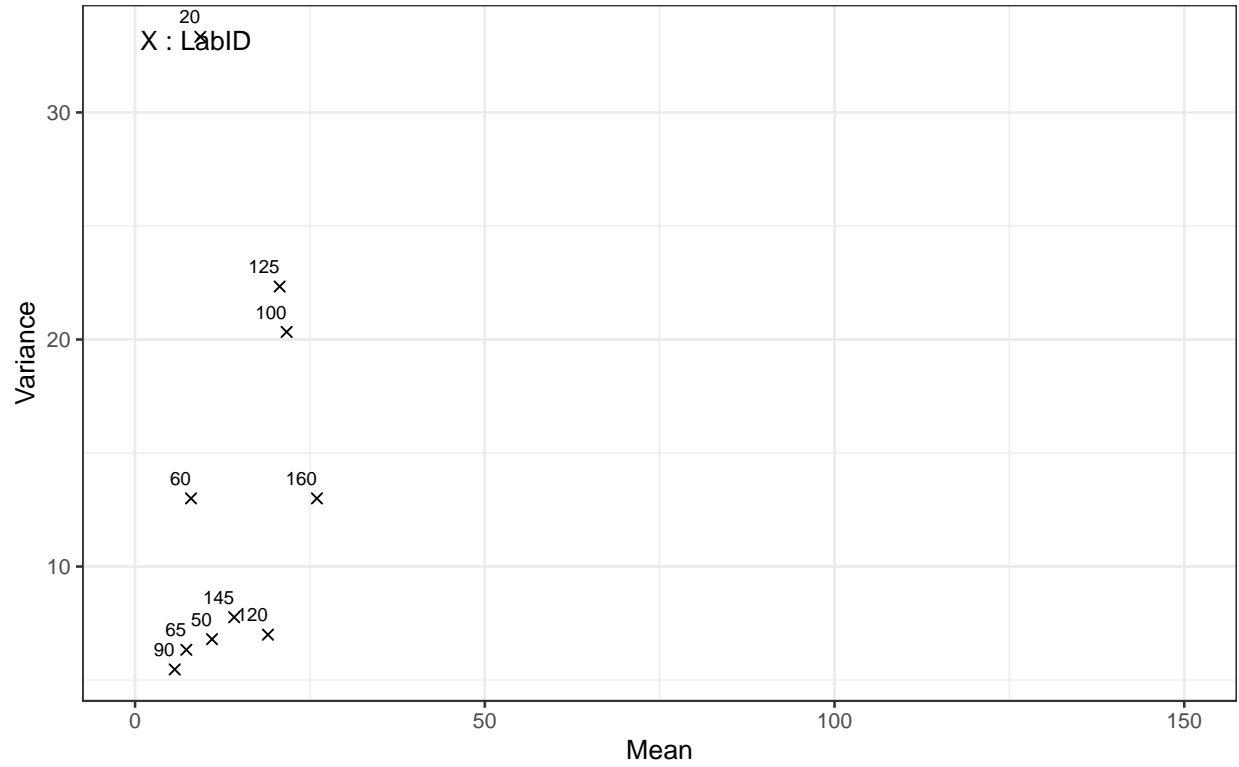




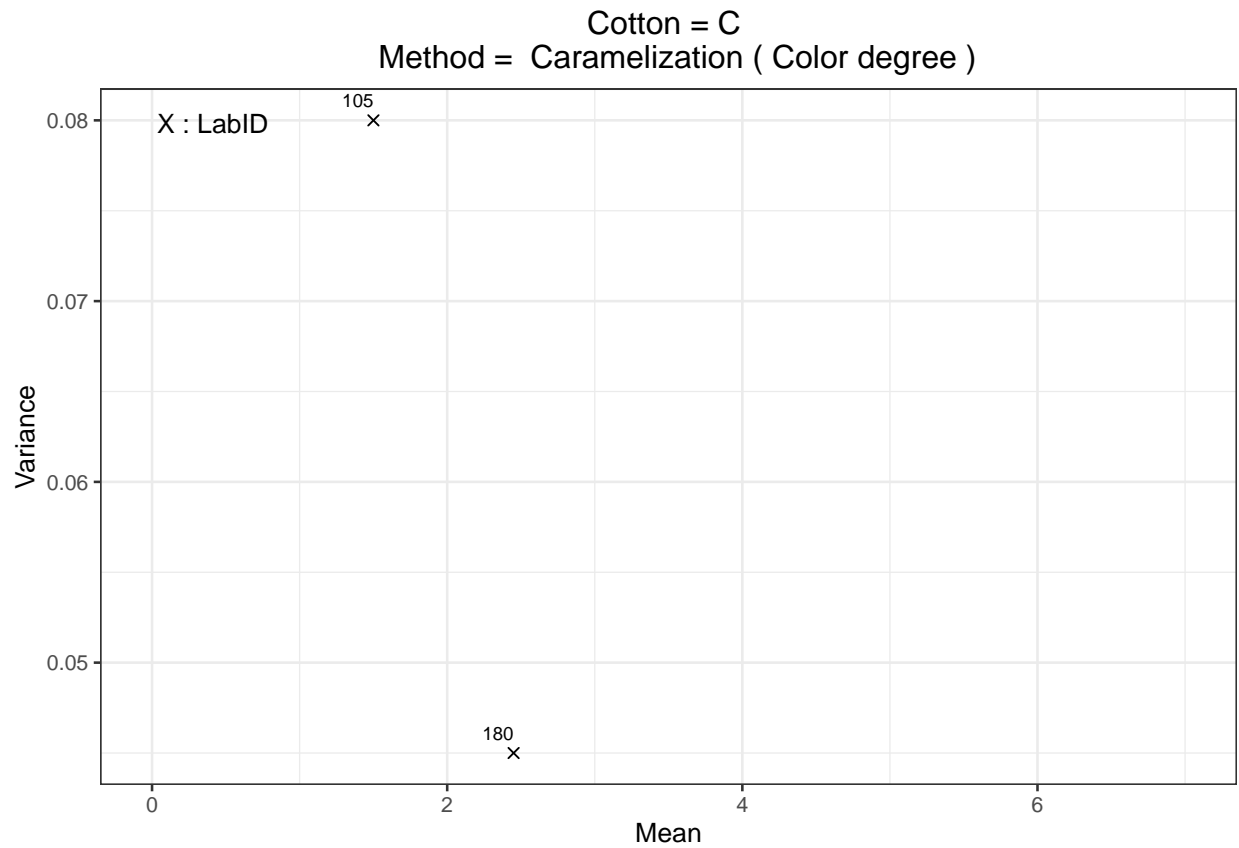




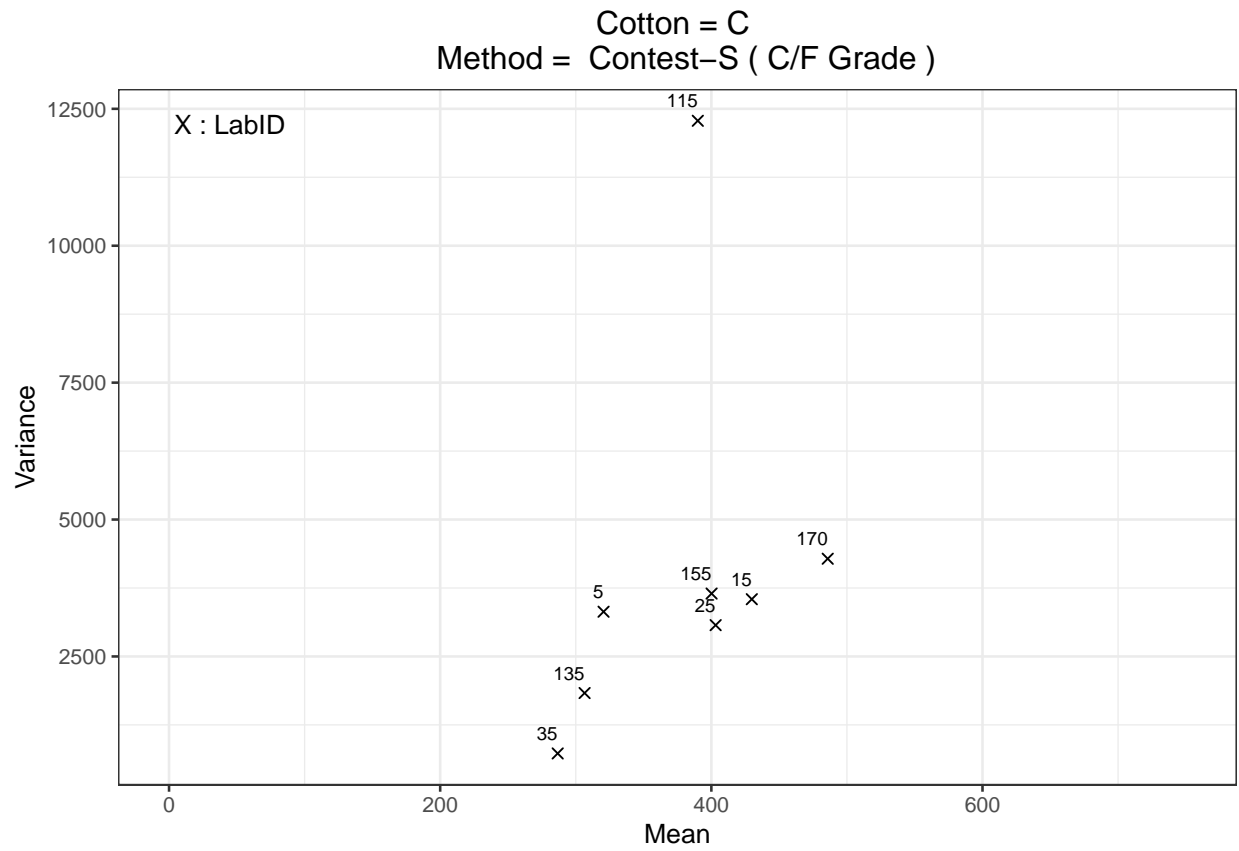
Cotton = B
Method = SCT (Sticky points)



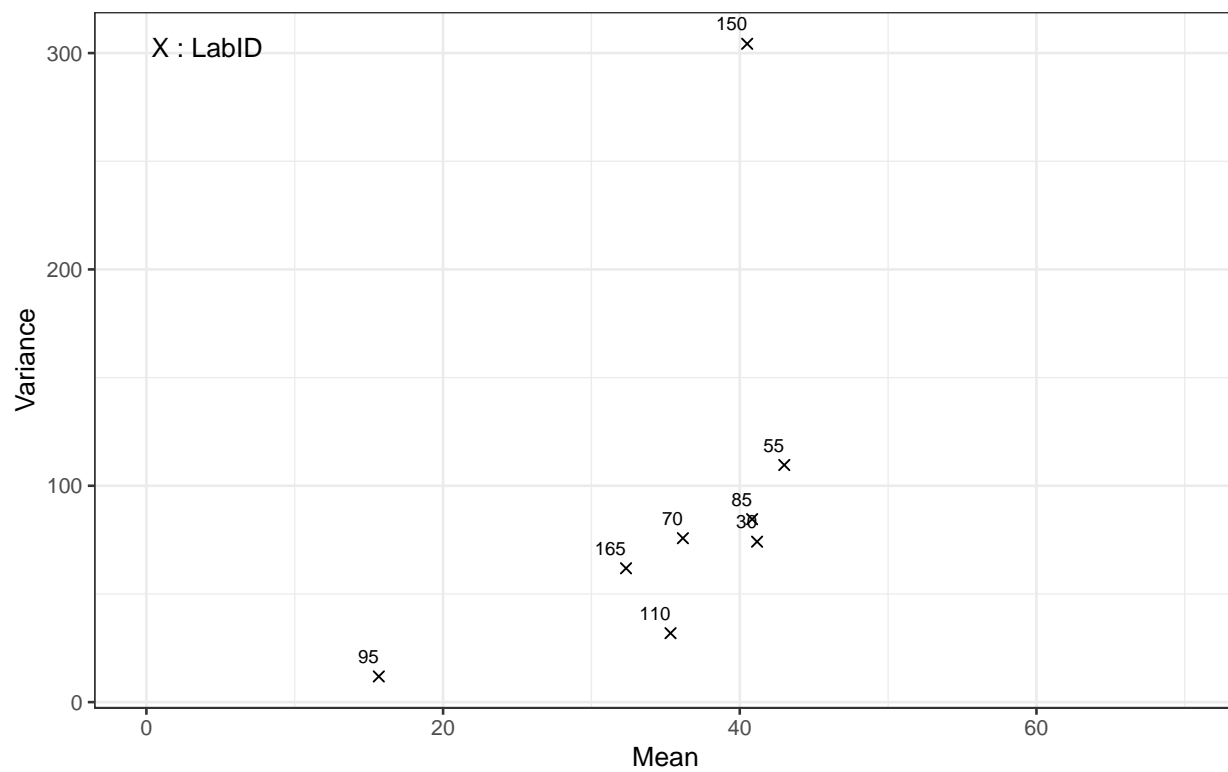
Cotton C : Variance between individual measurements = f(Mean) for all concerned labs

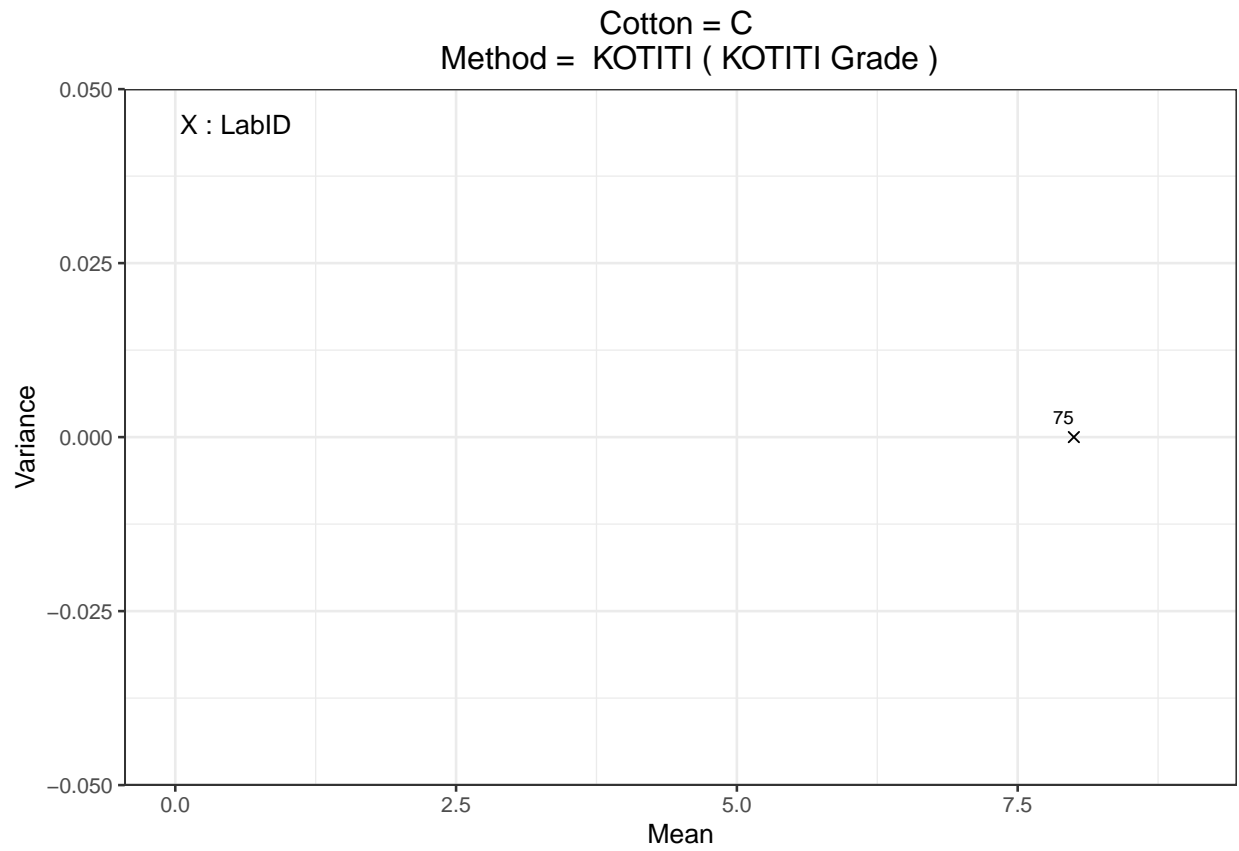


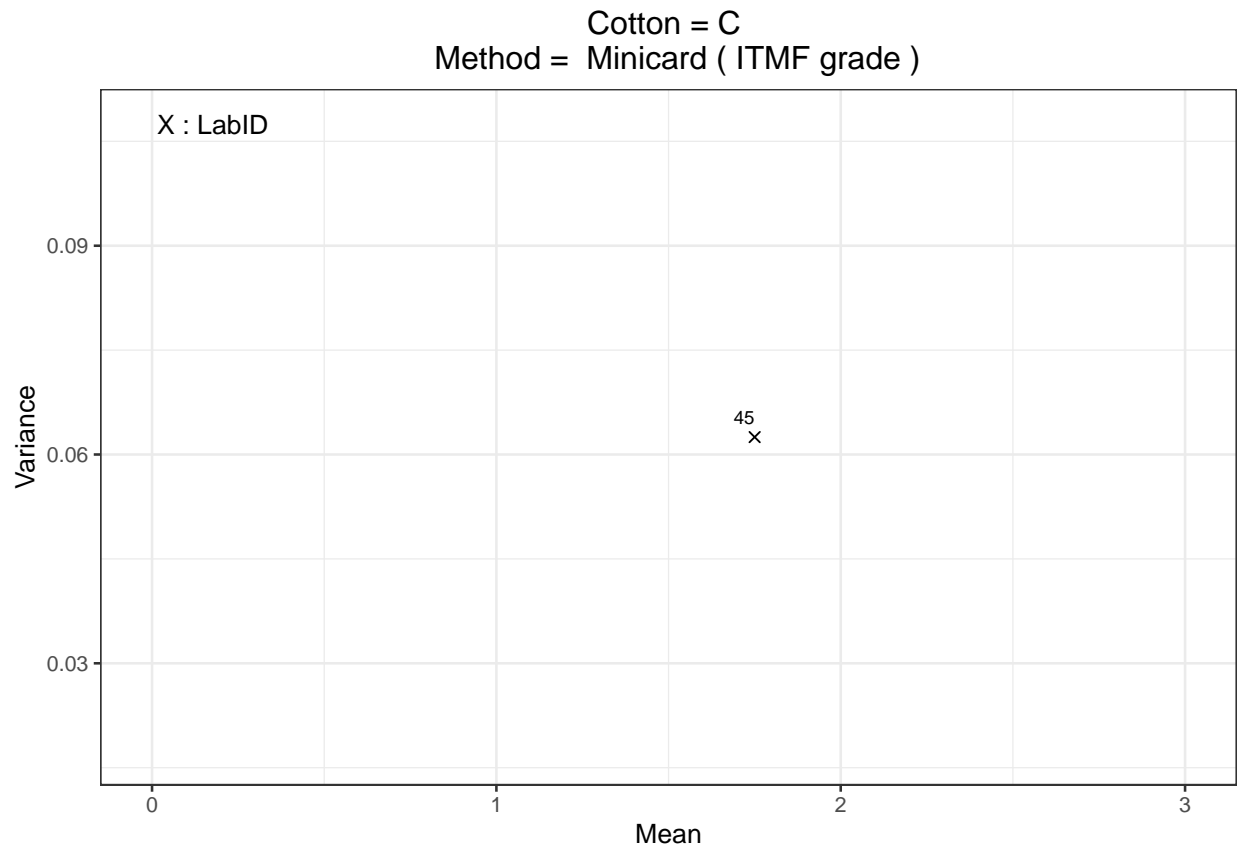
[1] “For Cotton = C and for method = Caramelization , 1 LabID (LabID being 40) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case.”



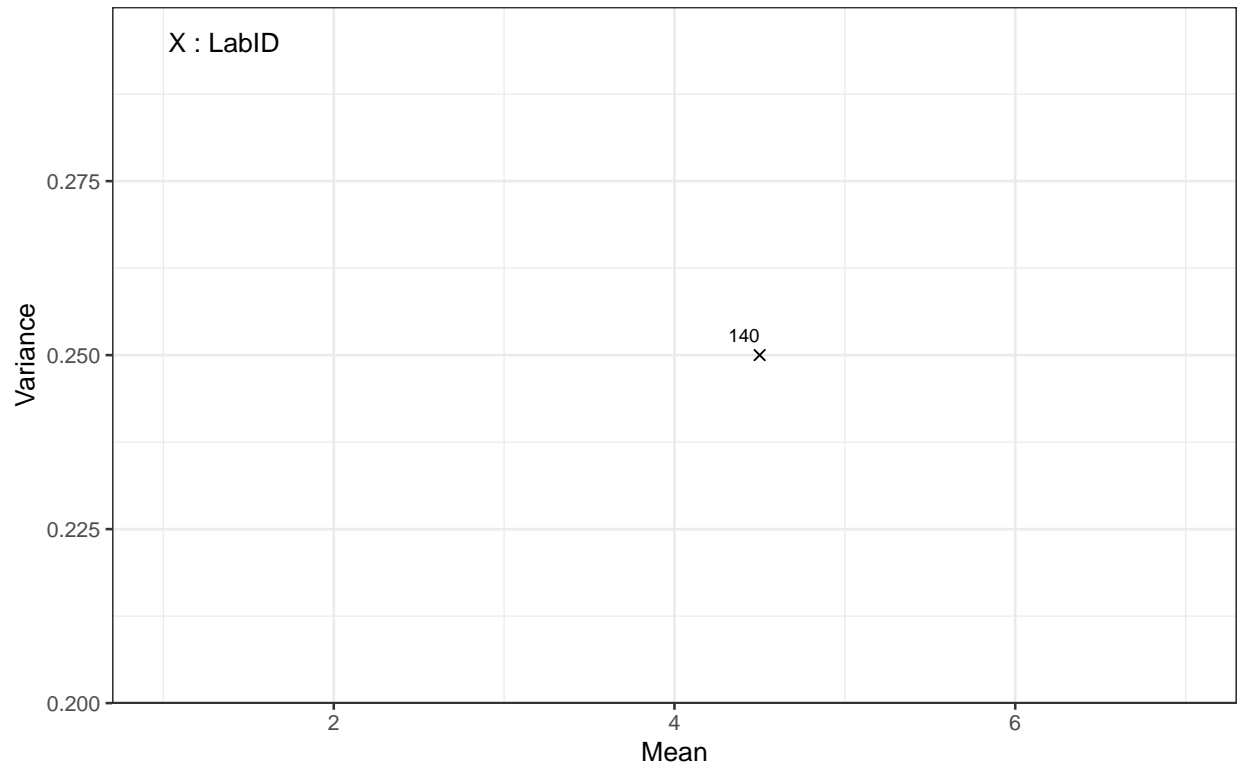
Cotton = C
Method = H2SD (Sticky points)

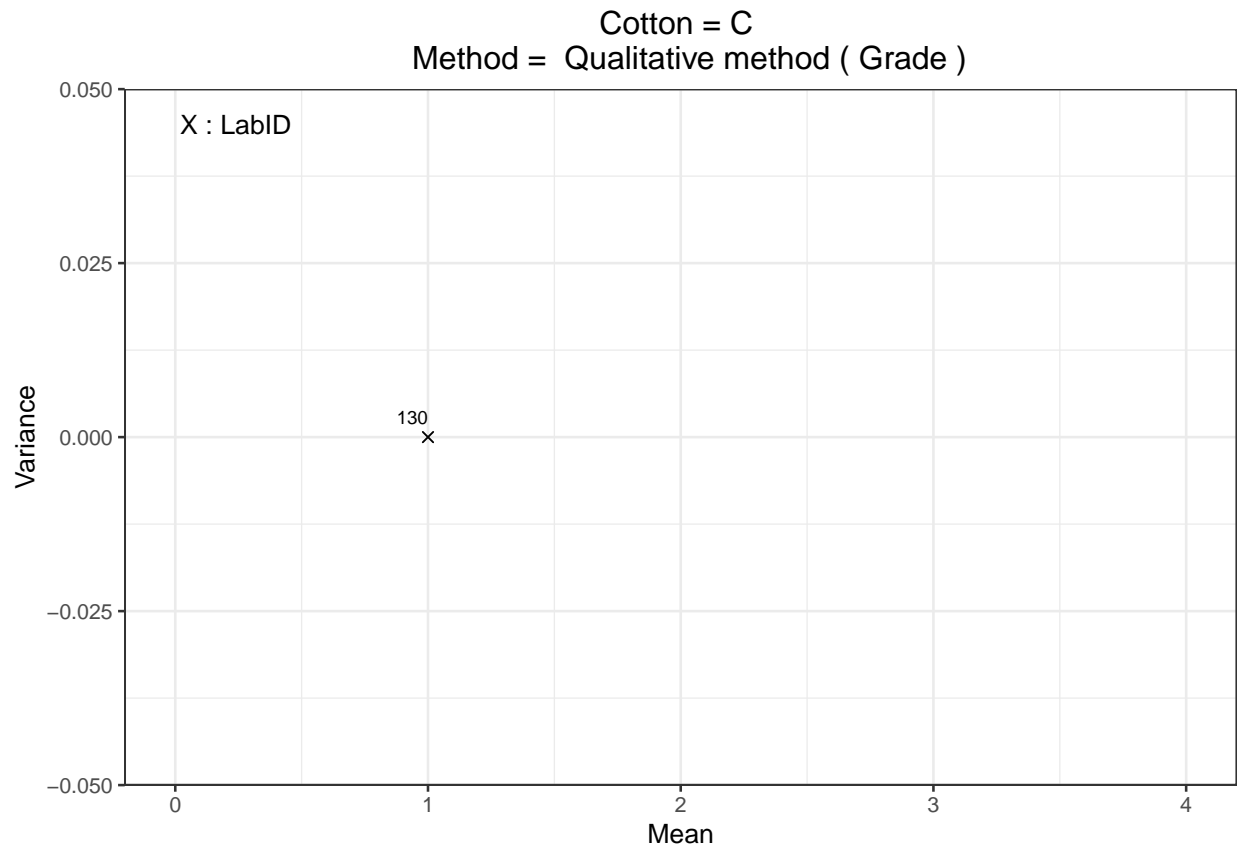


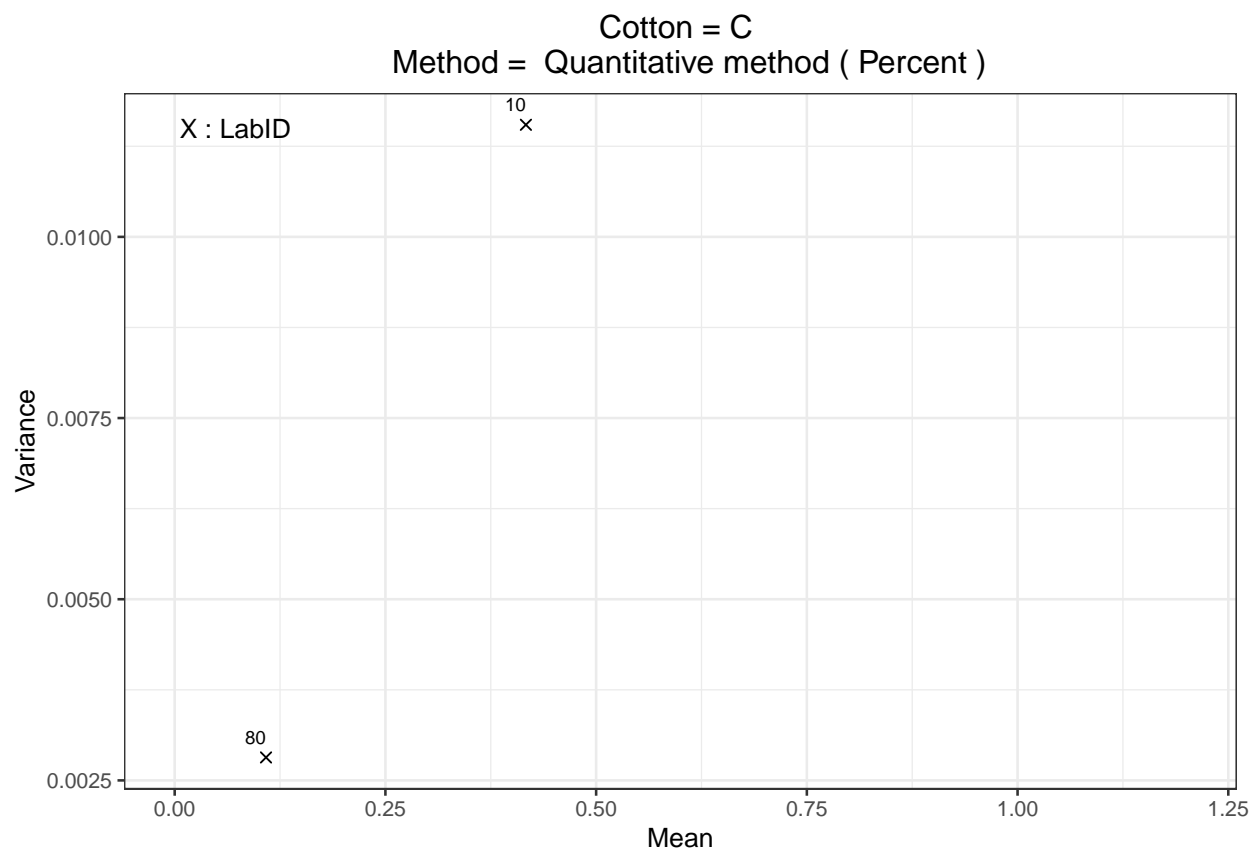


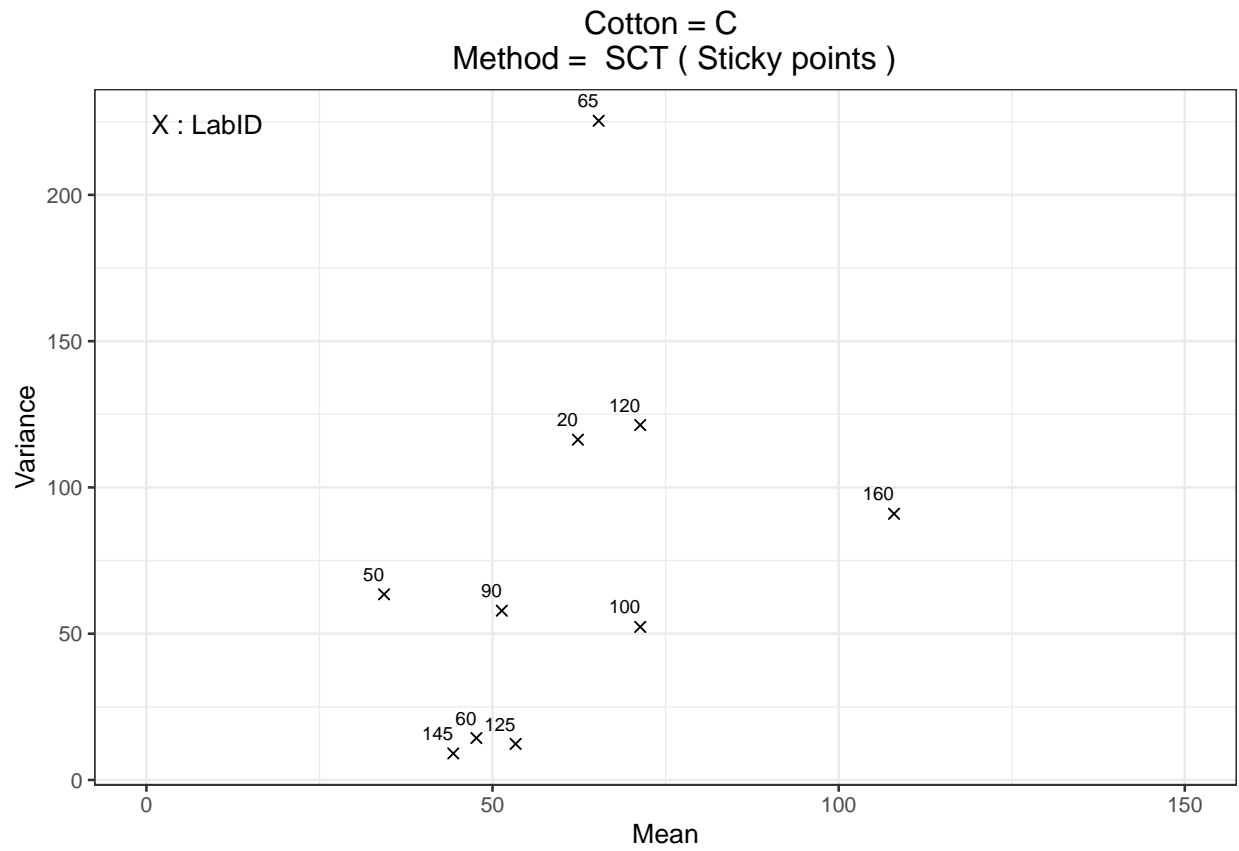


Cotton = C
Method = MinicardC (Cirad grade)

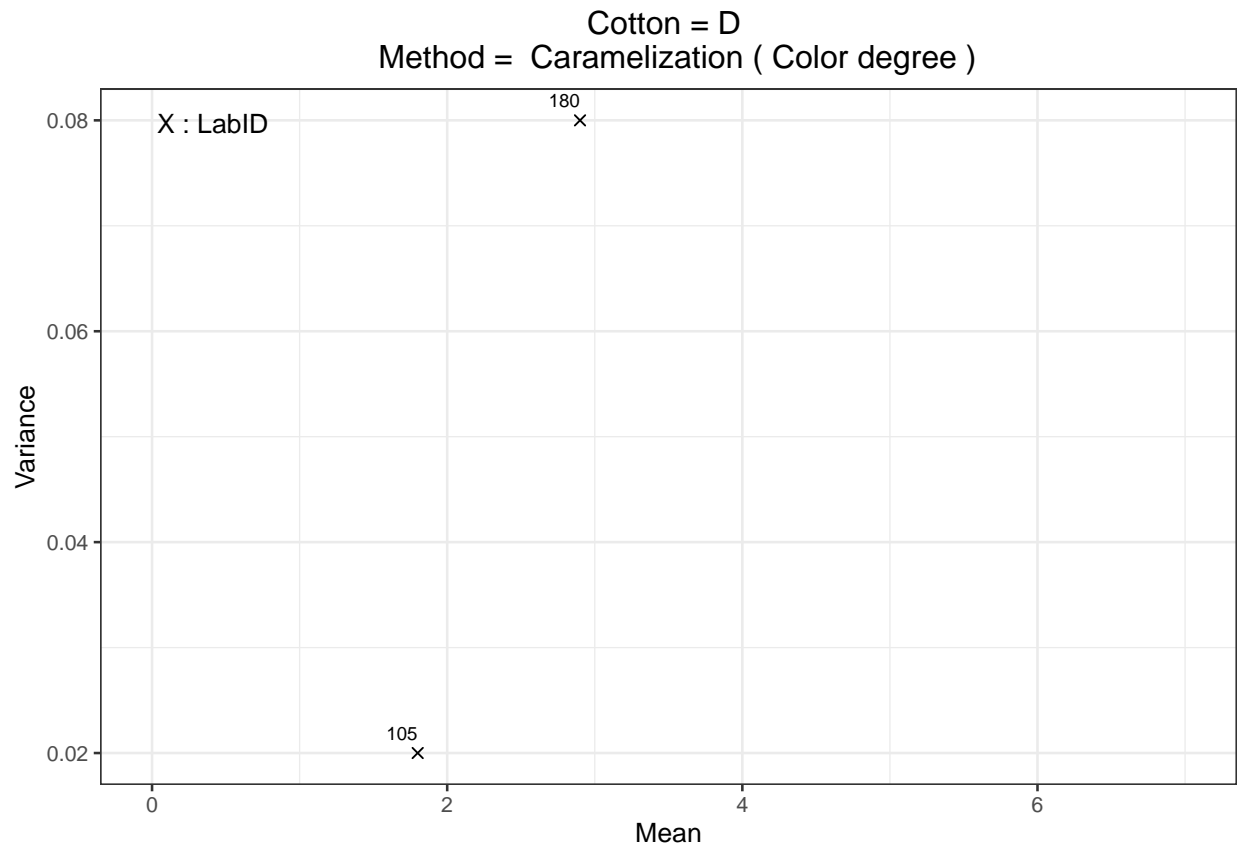






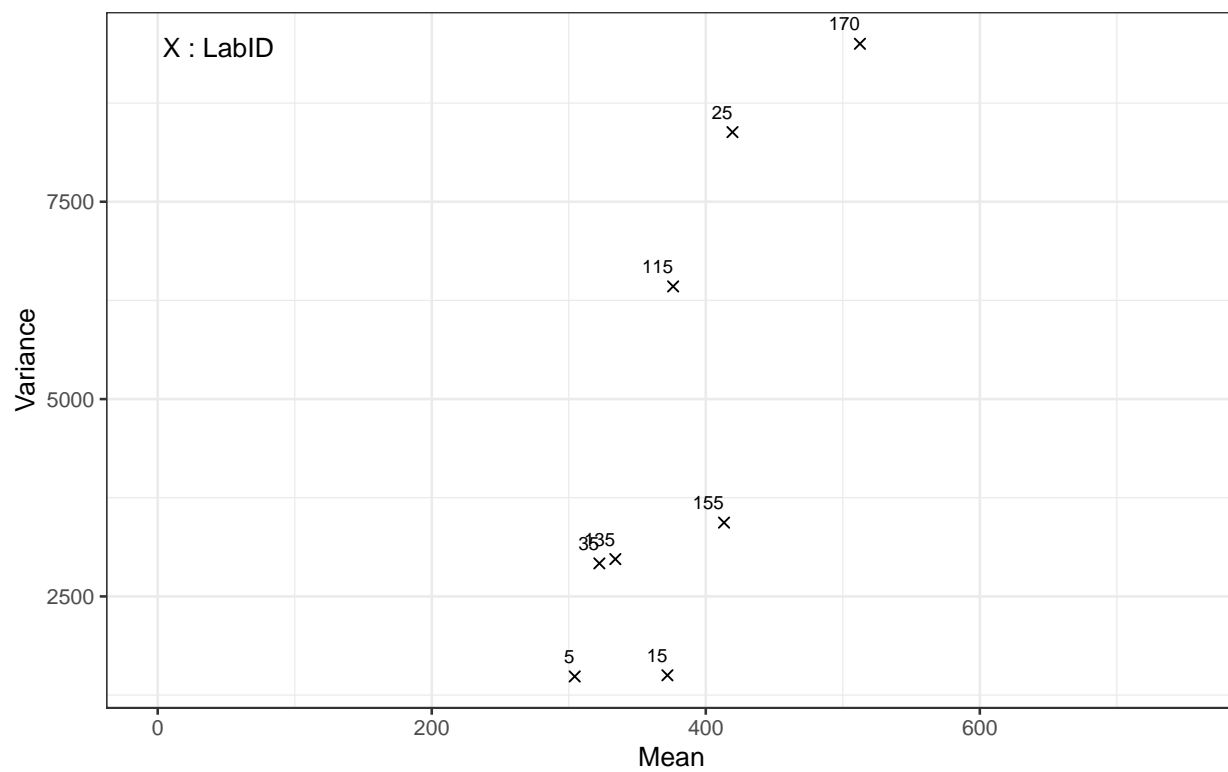


Cotton D : Variance between individual measurements = $f(\text{Mean})$ for all concerned labs

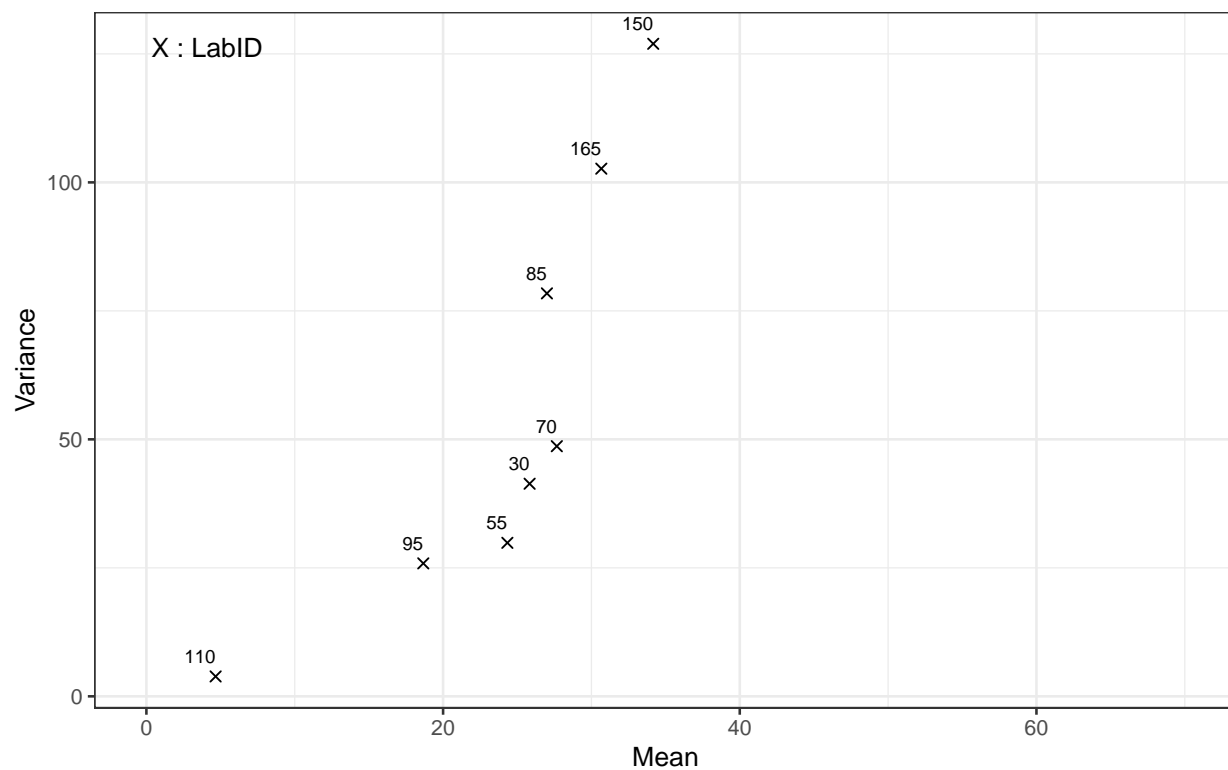


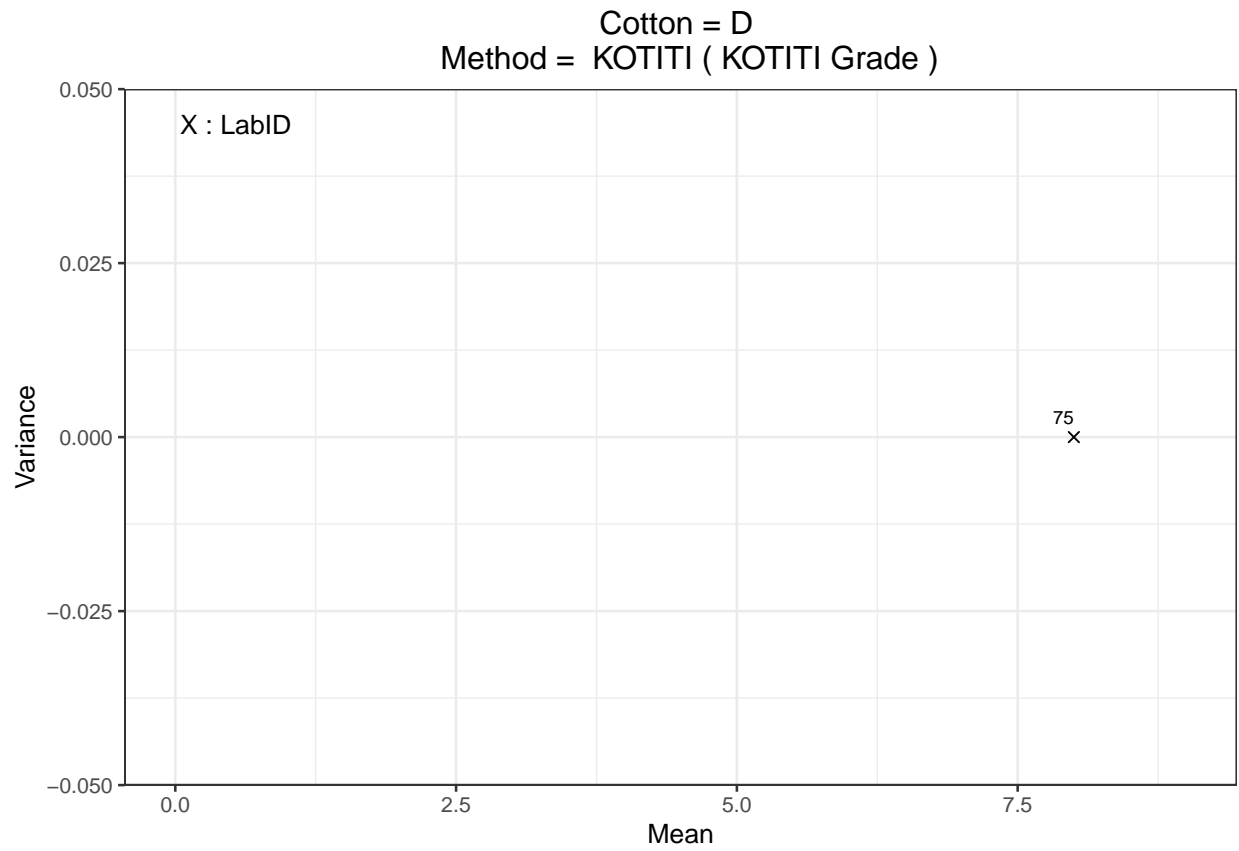
[1] “For Cotton = D and for method = Caramelization , 1 LabID (LabID being 40) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case.”

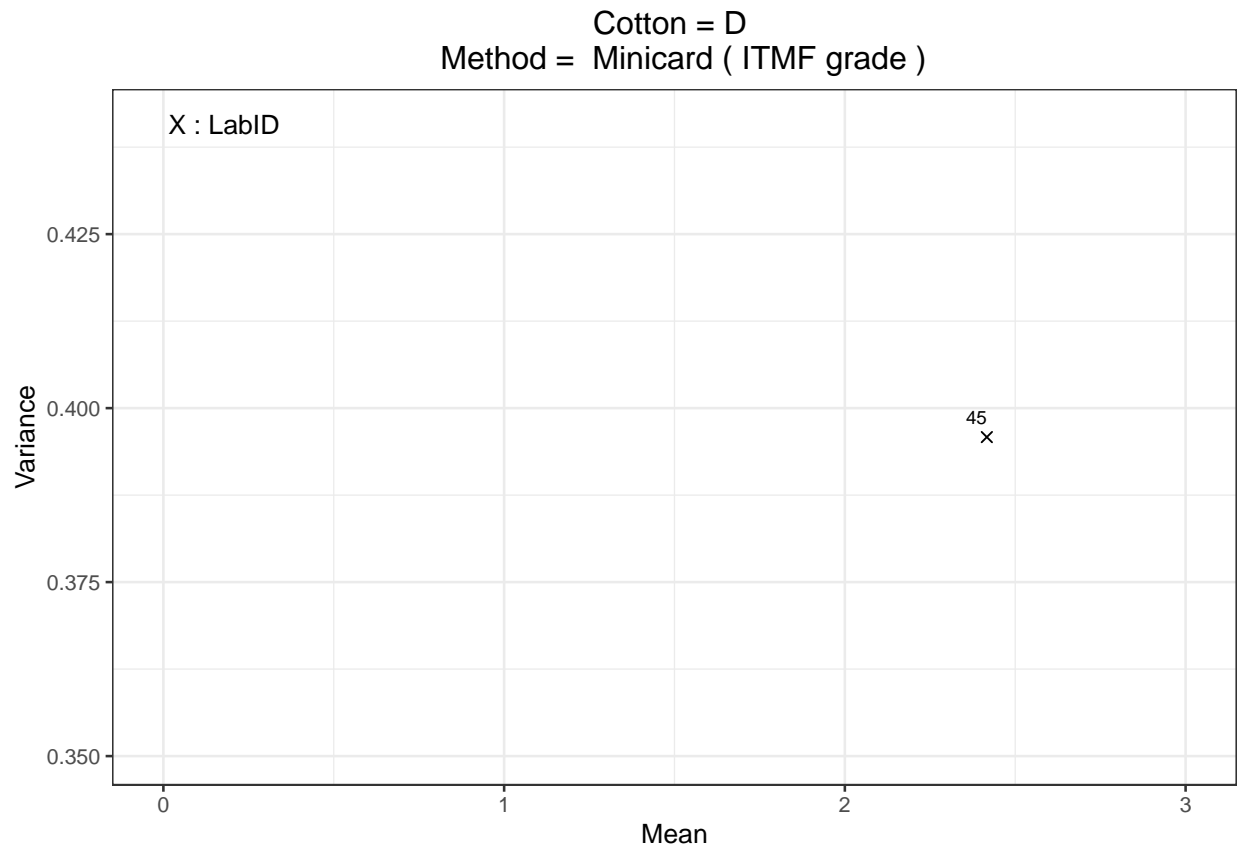
Cotton = D
Method = Contest-S (C/F Grade)

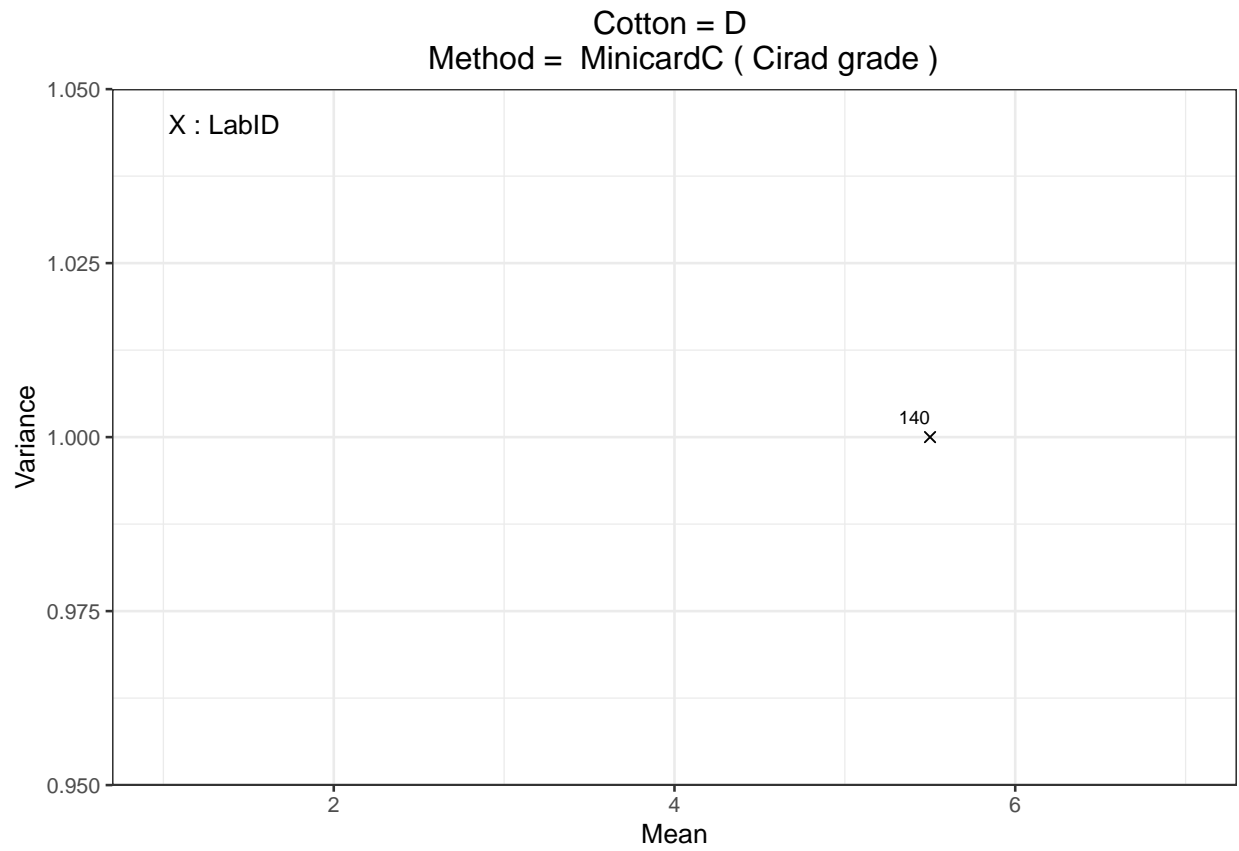


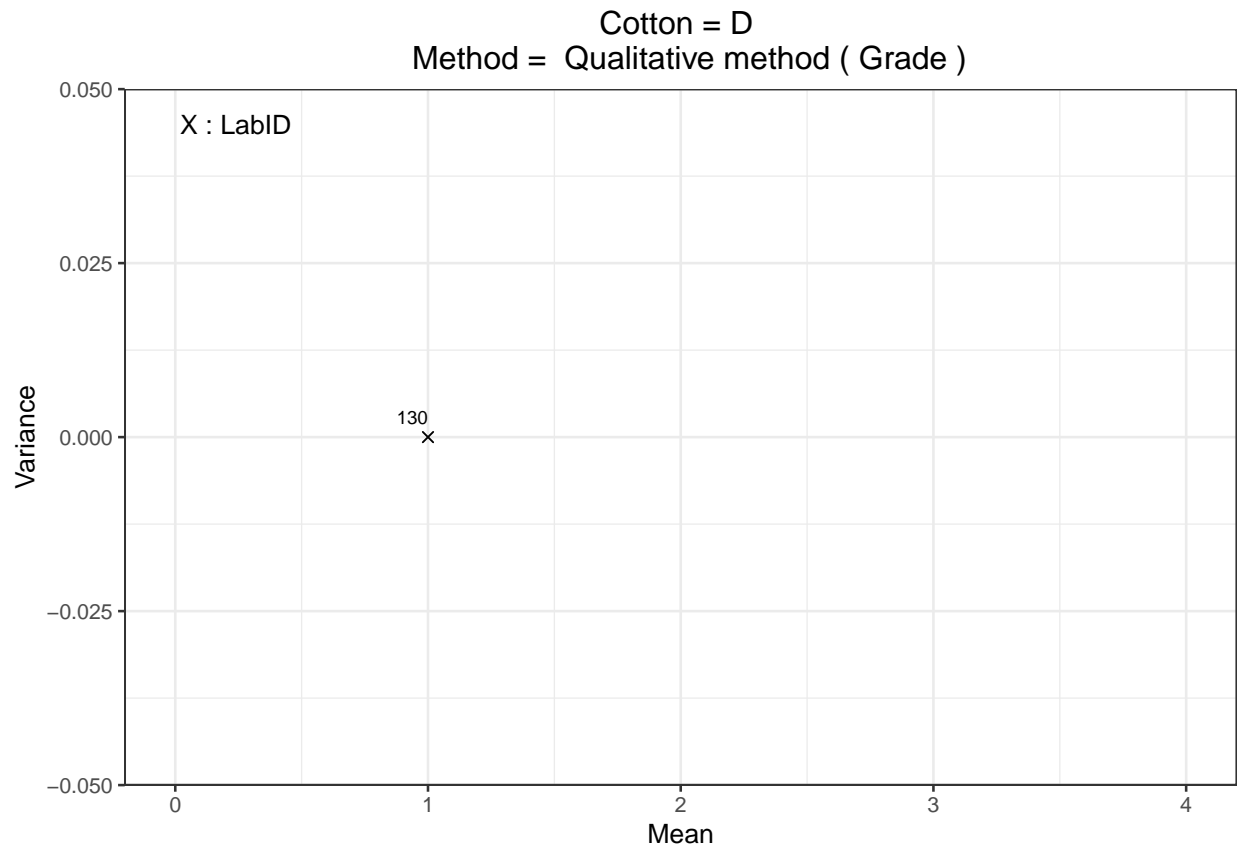
Cotton = D
Method = H2SD (Sticky points)

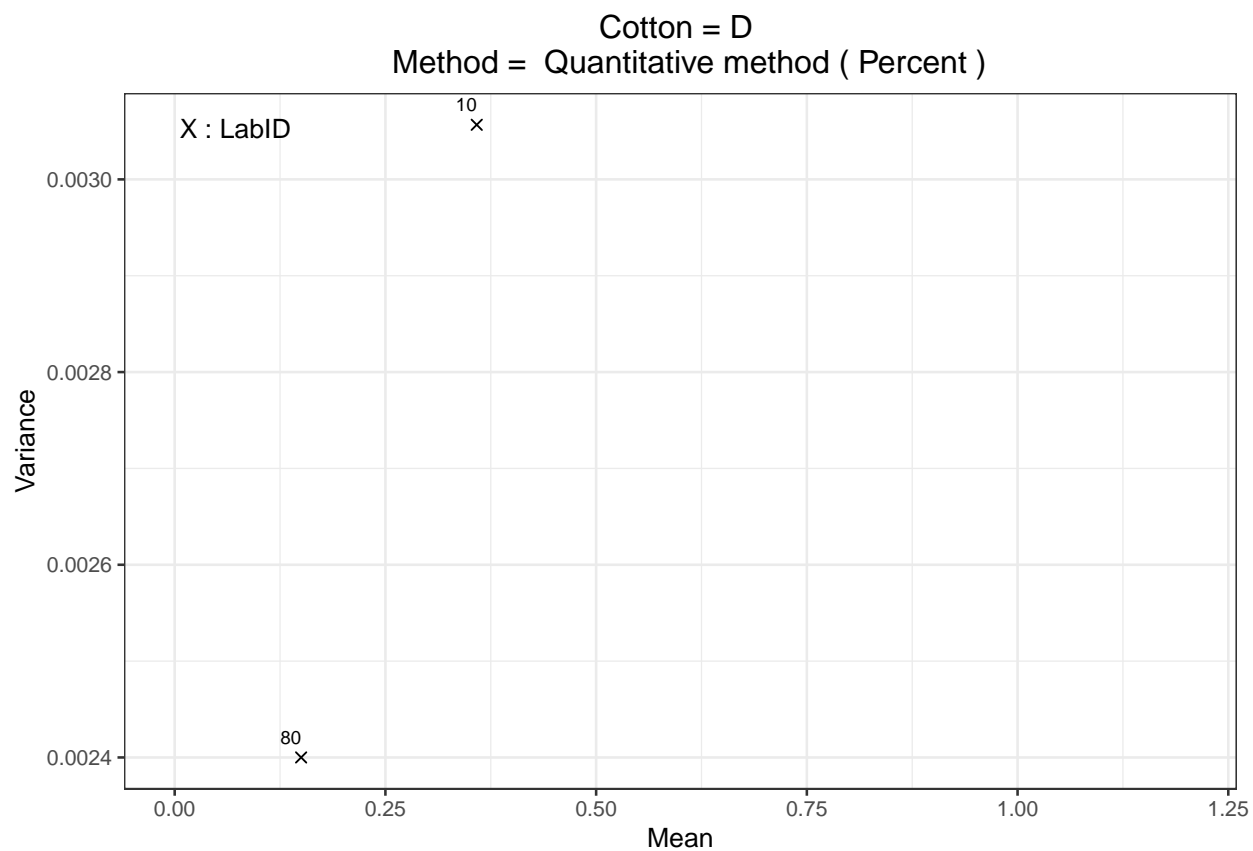




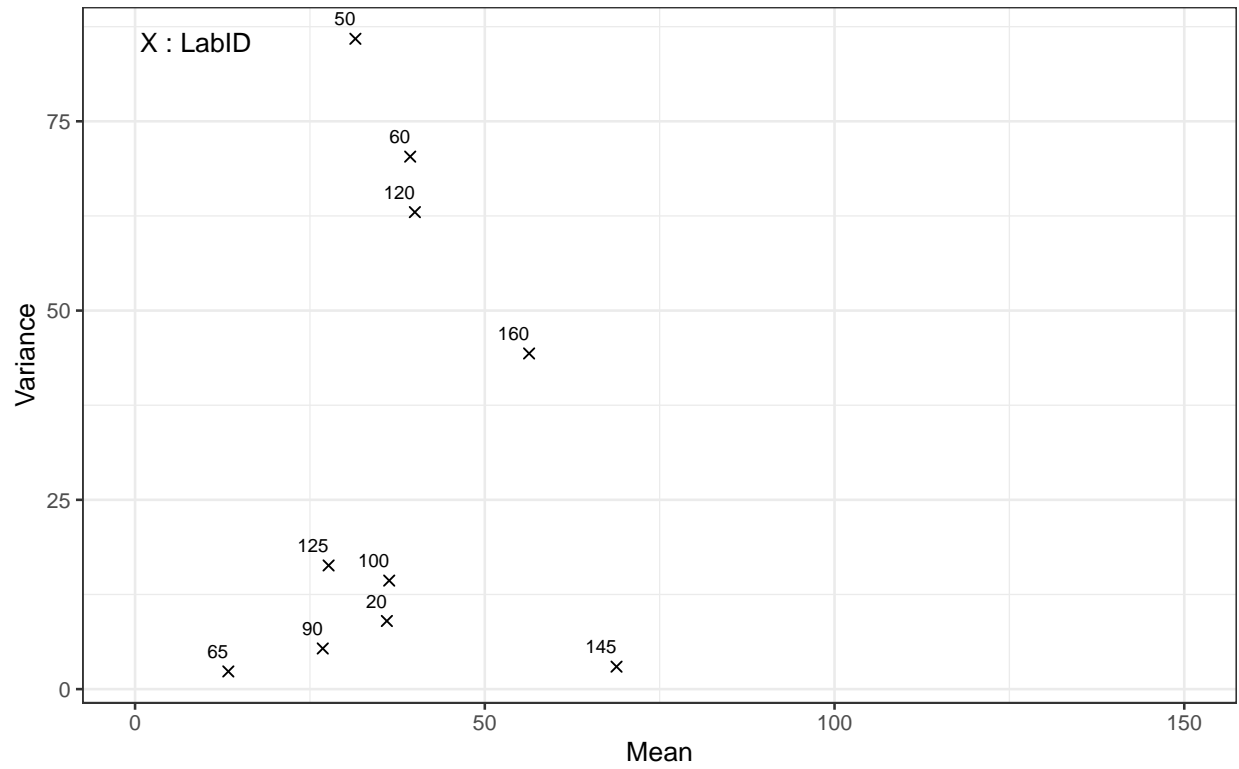




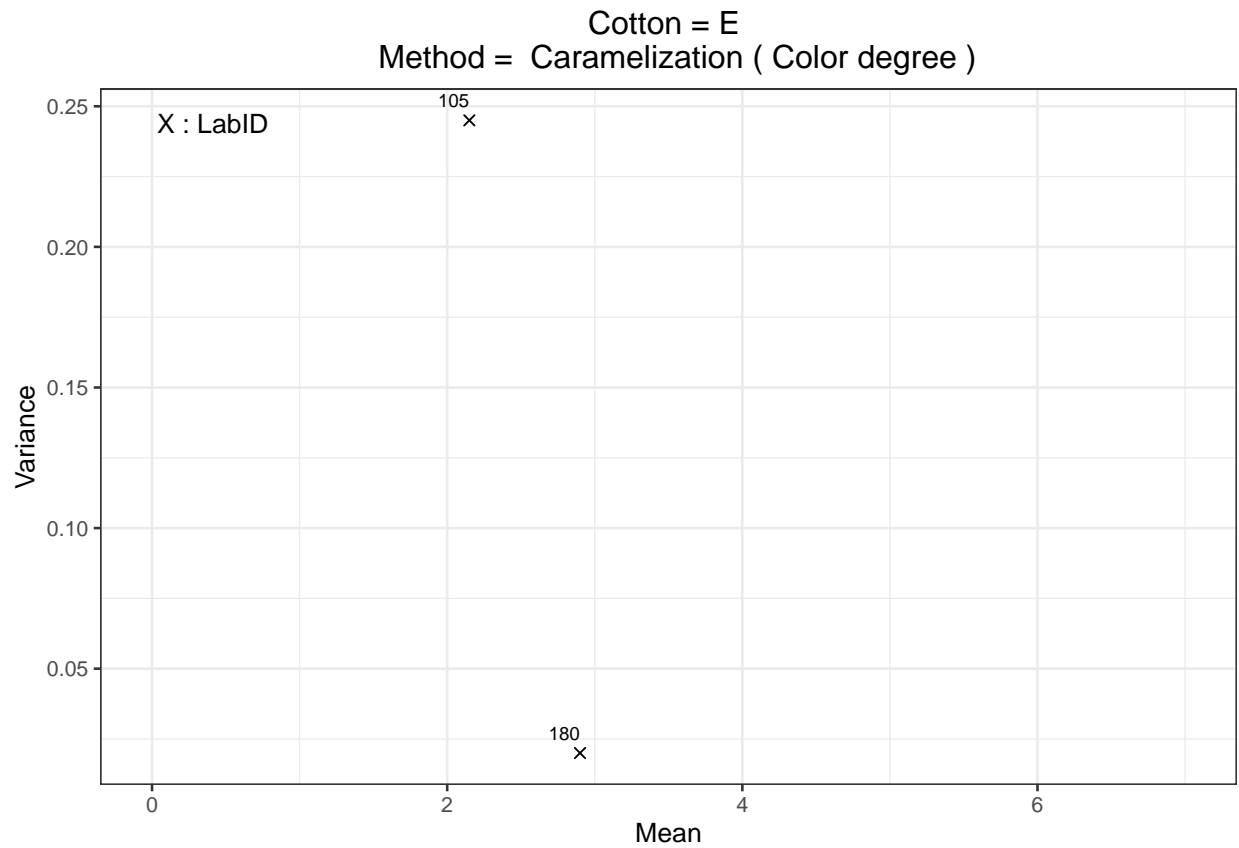




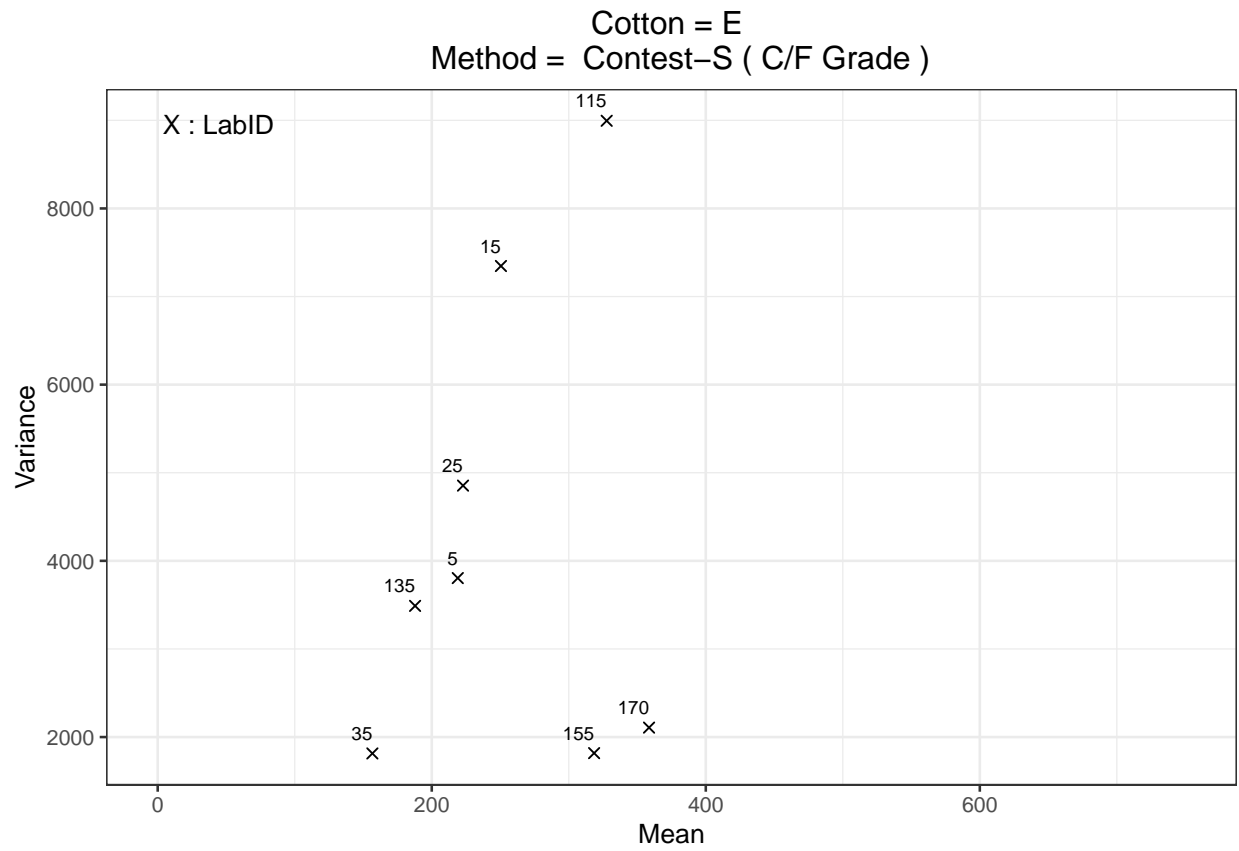
Cotton = D
Method = SCT (Sticky points)

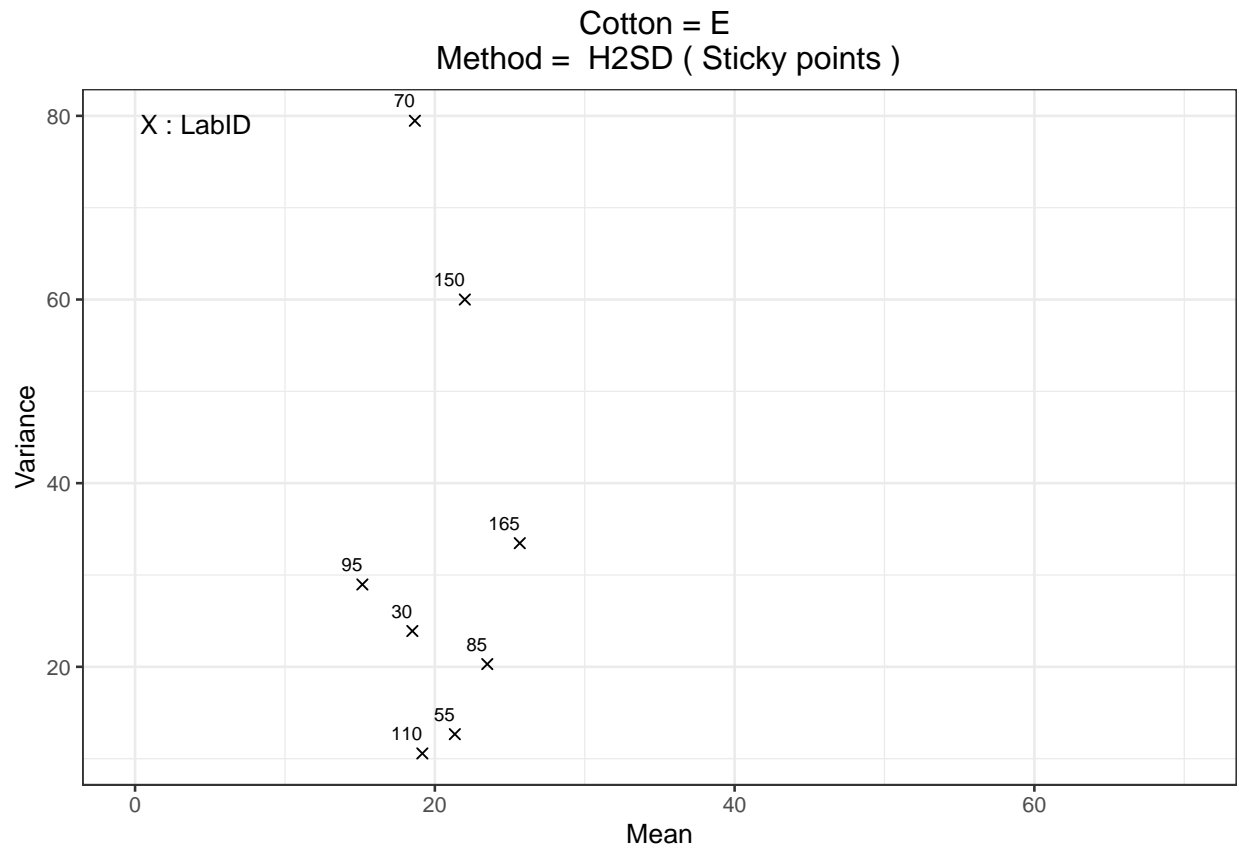


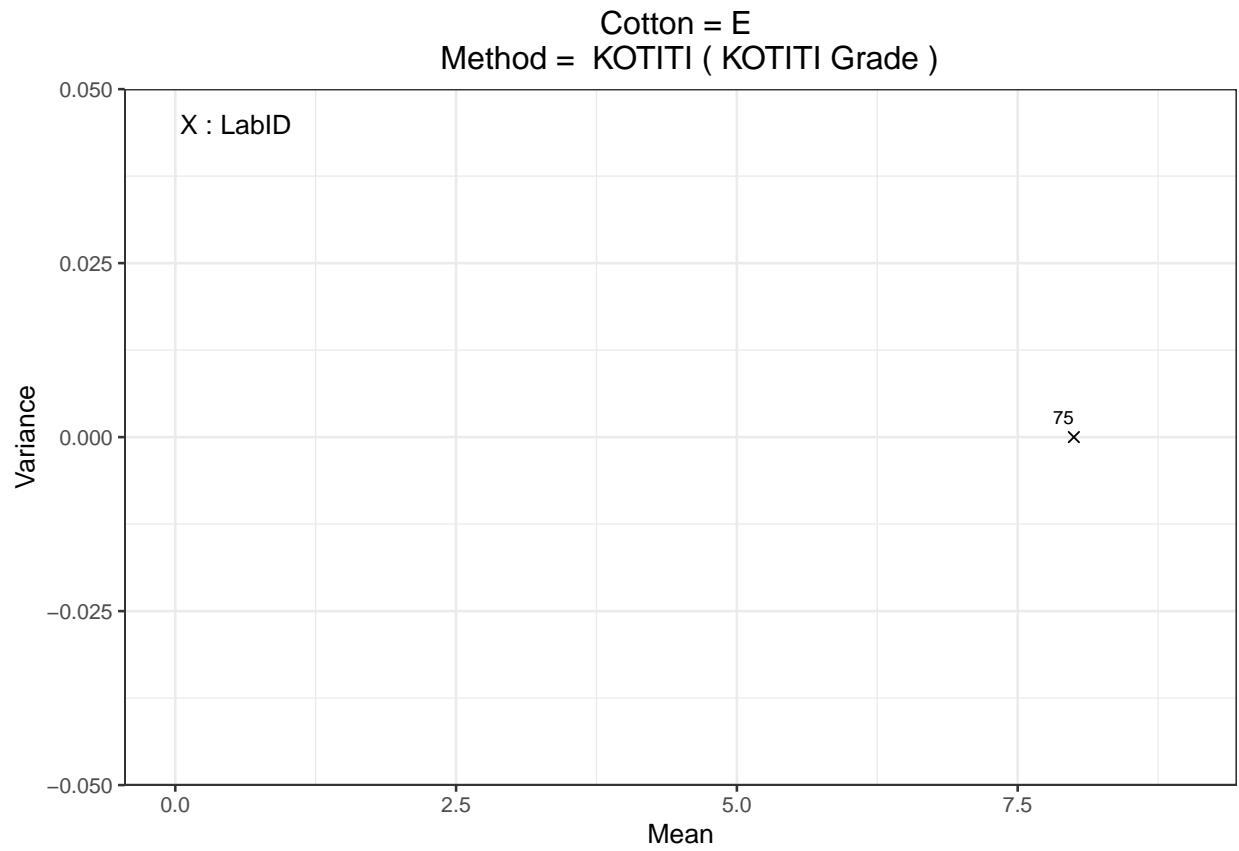
Cotton E : Variance between individual measurements = f(Mean) for all concerned labs

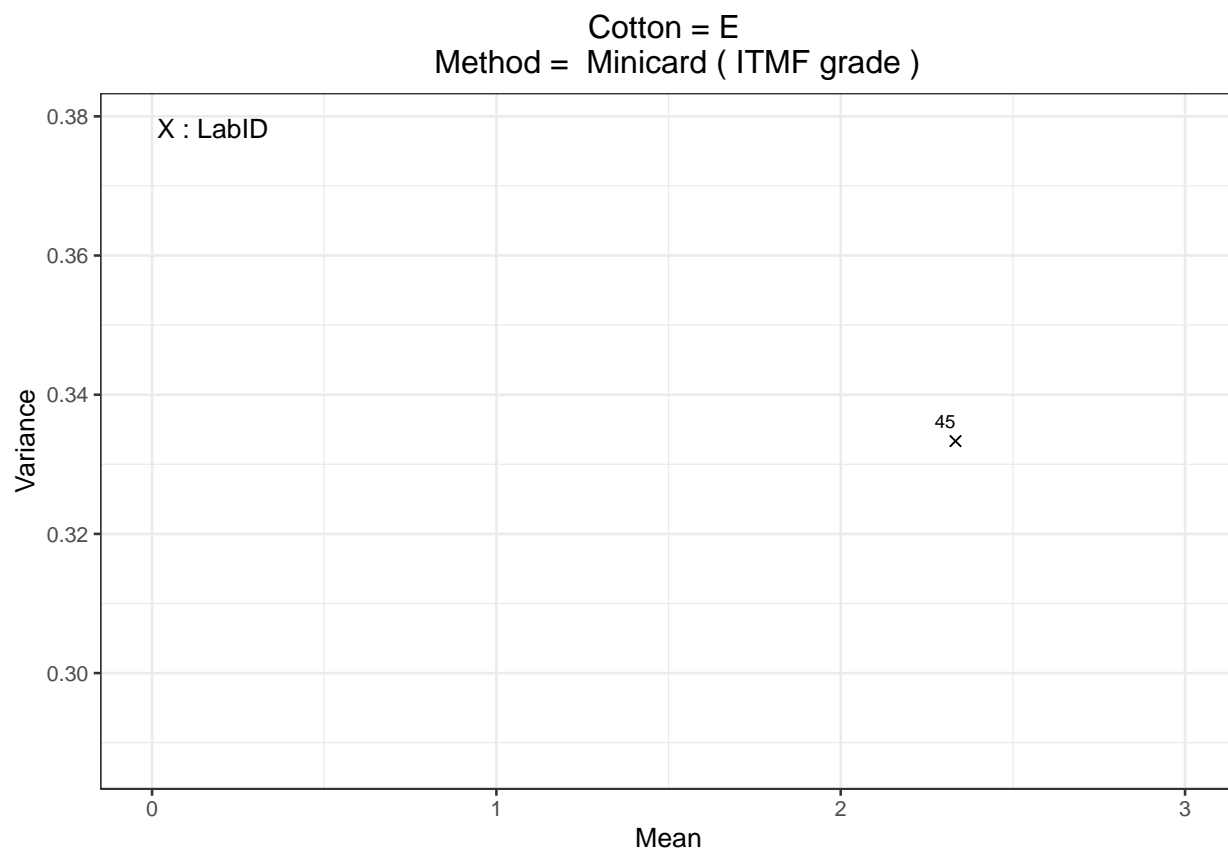


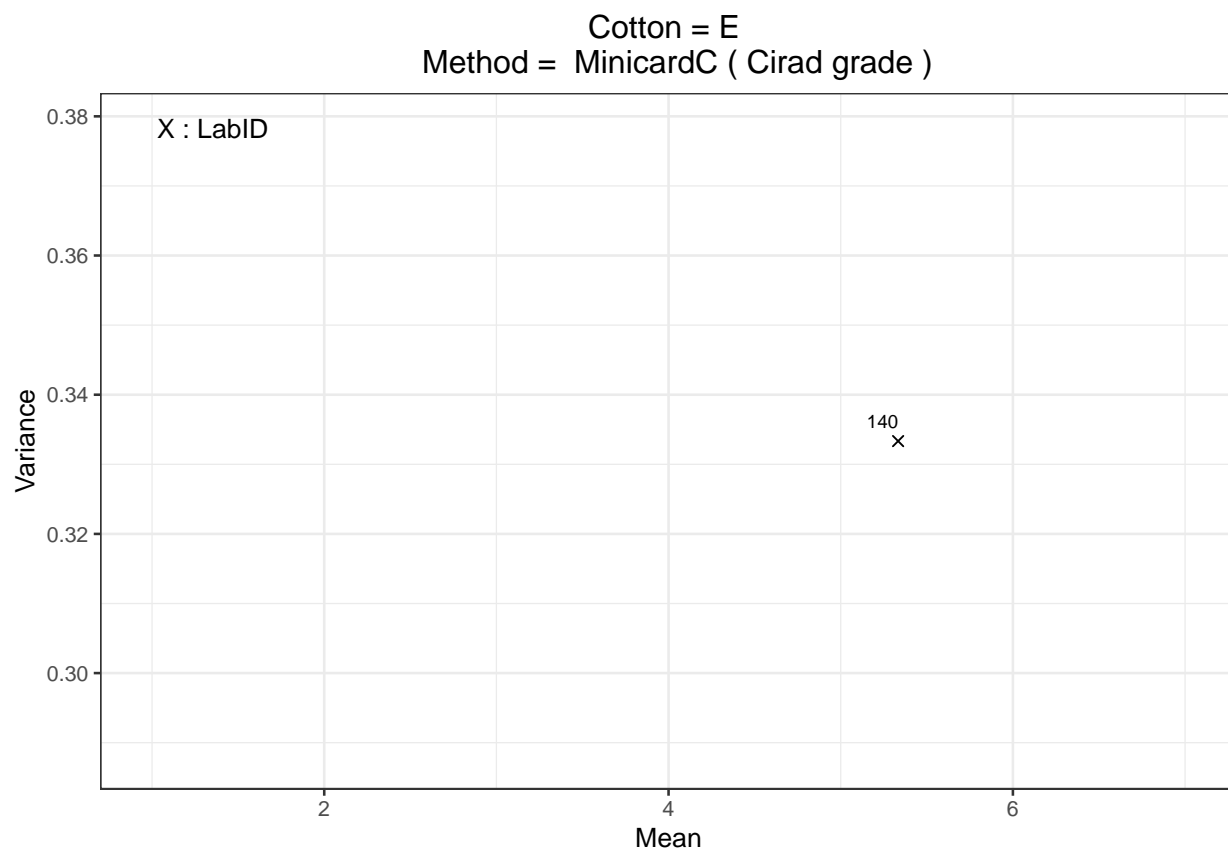
[1] “For Cotton = E and for method = Caramelization , 1 LabID (LabID being 40) cannot be shown on this chart as only one measurement was performed and, therefore, a variance cannot be calculated in this case.”

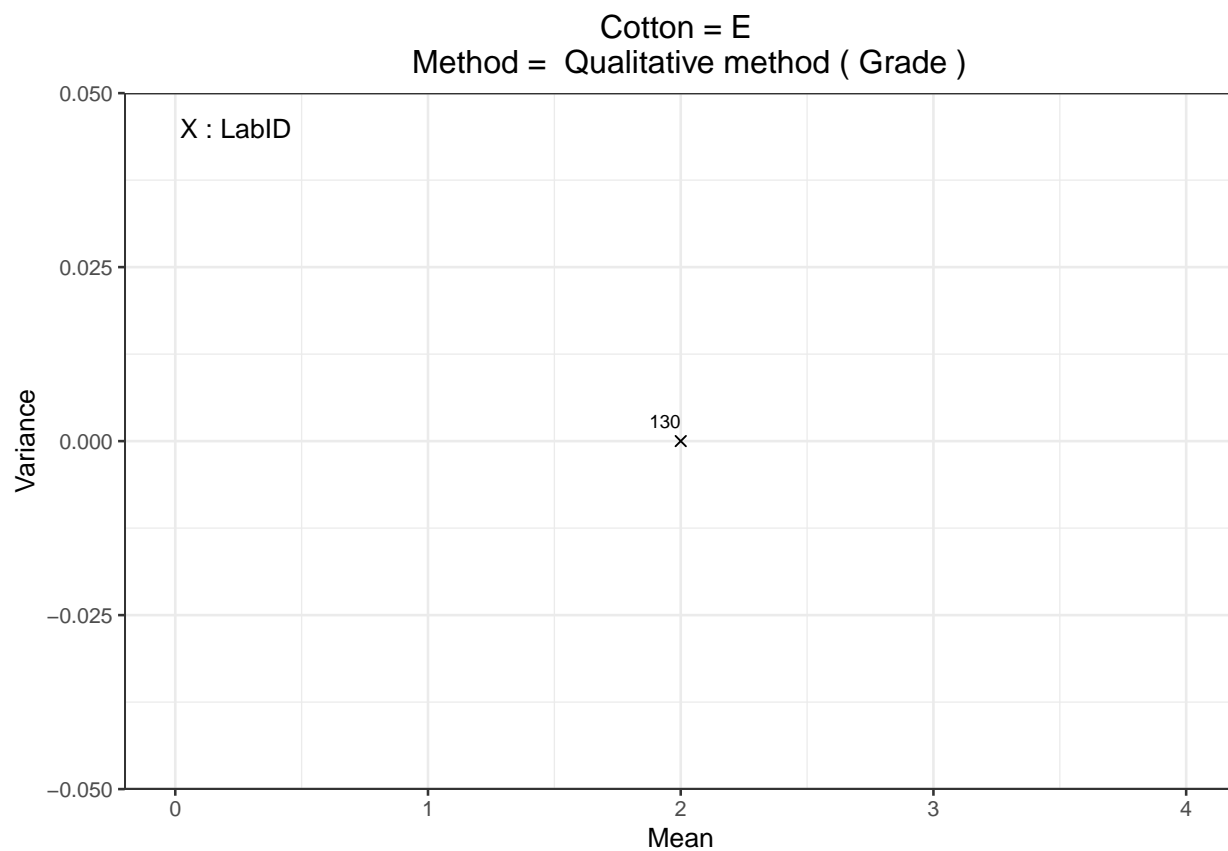


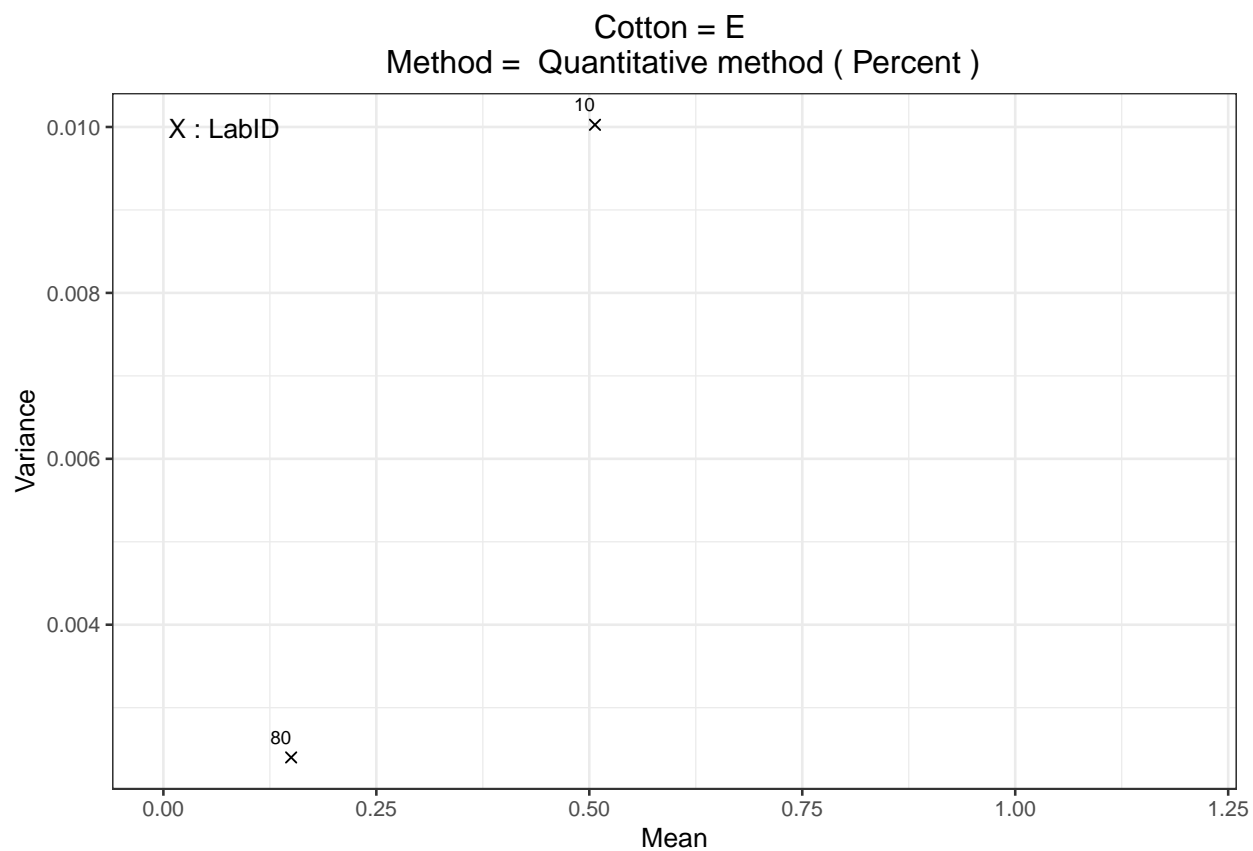


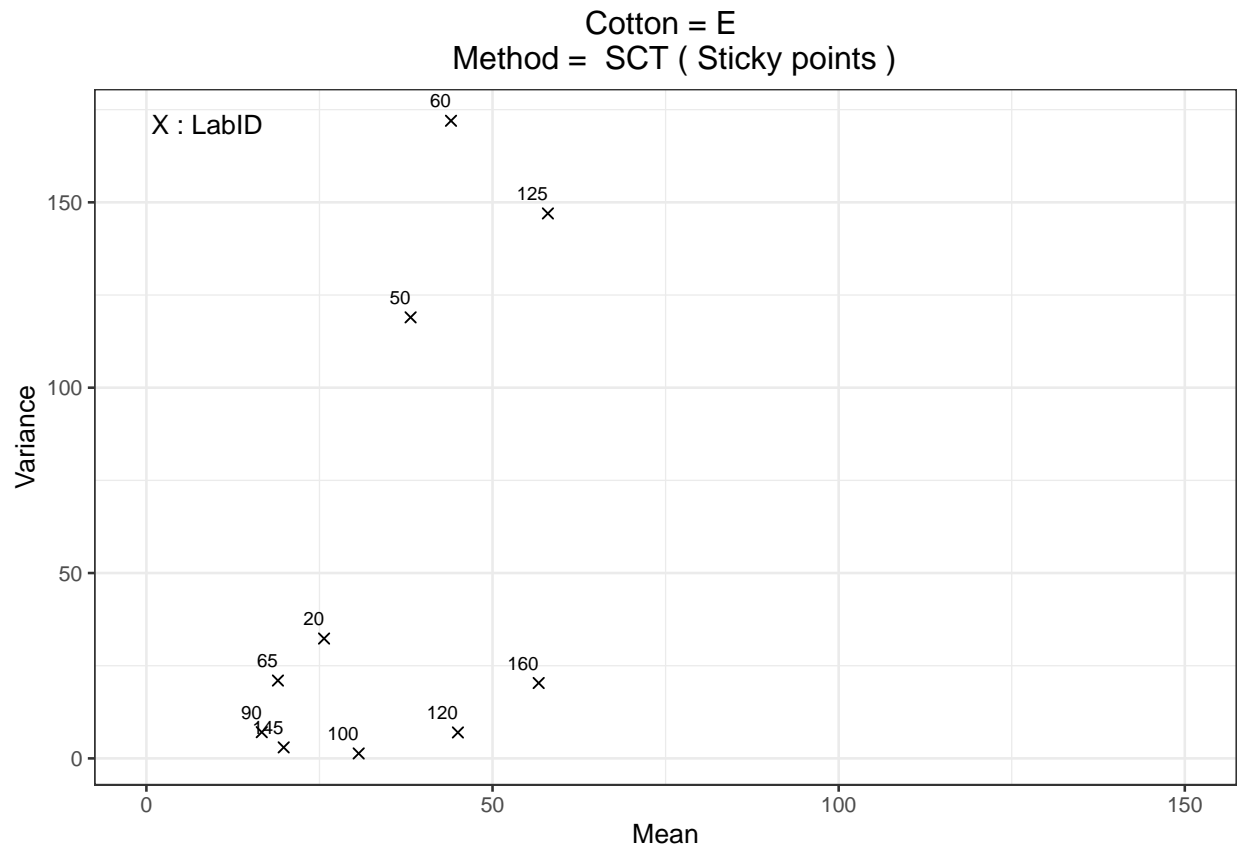








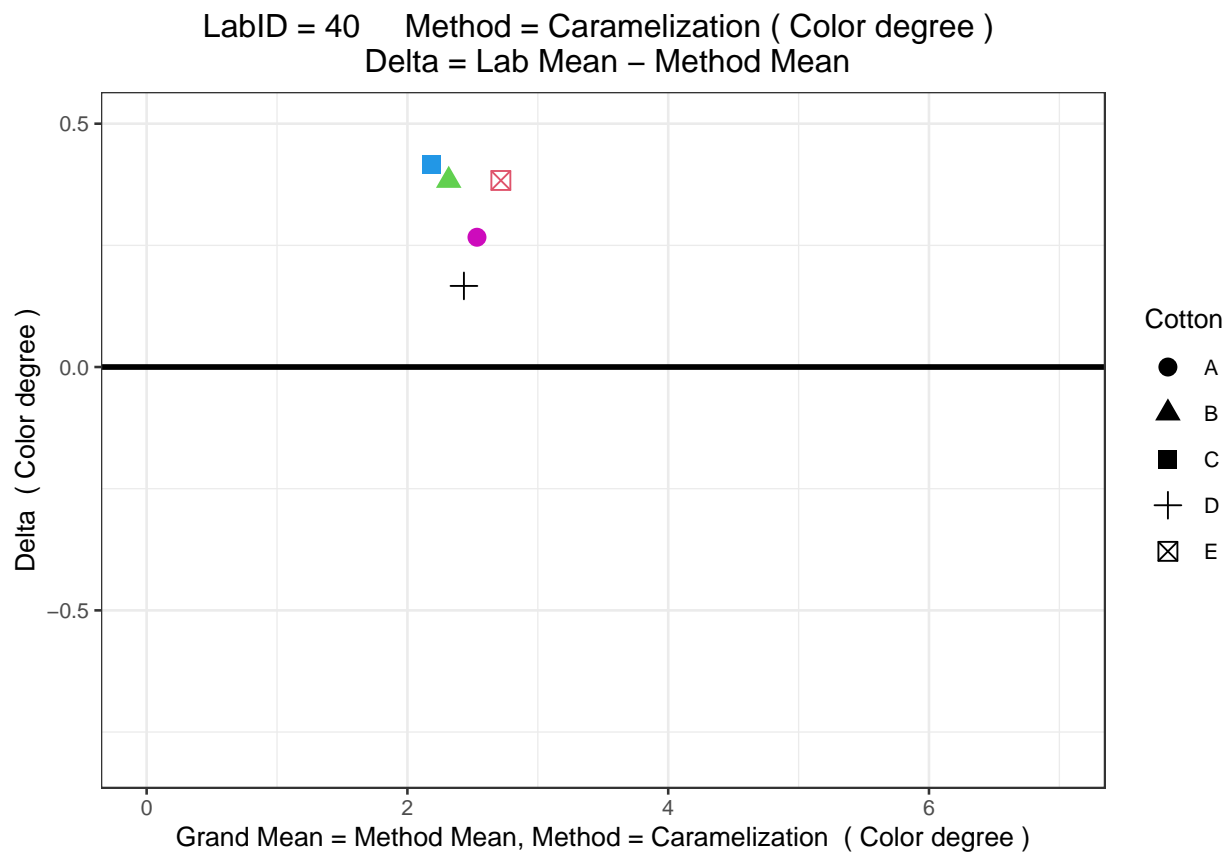




CSITC type charts: distance Delta of Lab readings to the Grand Mean by Method and by LabID ⁶

This type of chart is devoted to displaying the ability of any Method and any LabID to not deviate from the observed GrandMean of any given characteristic whatever the measured levels of the participating cottons, and then covering the range of stickiness of the participating cottons in this case. If only one LabID is using a given Method, then all Delta points (one point per participating cotton) will be positionned at Delta = 0 (Y axis) and at the GrandMean values of the cottons (X axis). If two labs are using a given Method, then their respective Delta points will be positionned in symetry of the X axis at the respective Delta values (Y axis) and at the GrandMean values of the cottons (on the X axis).

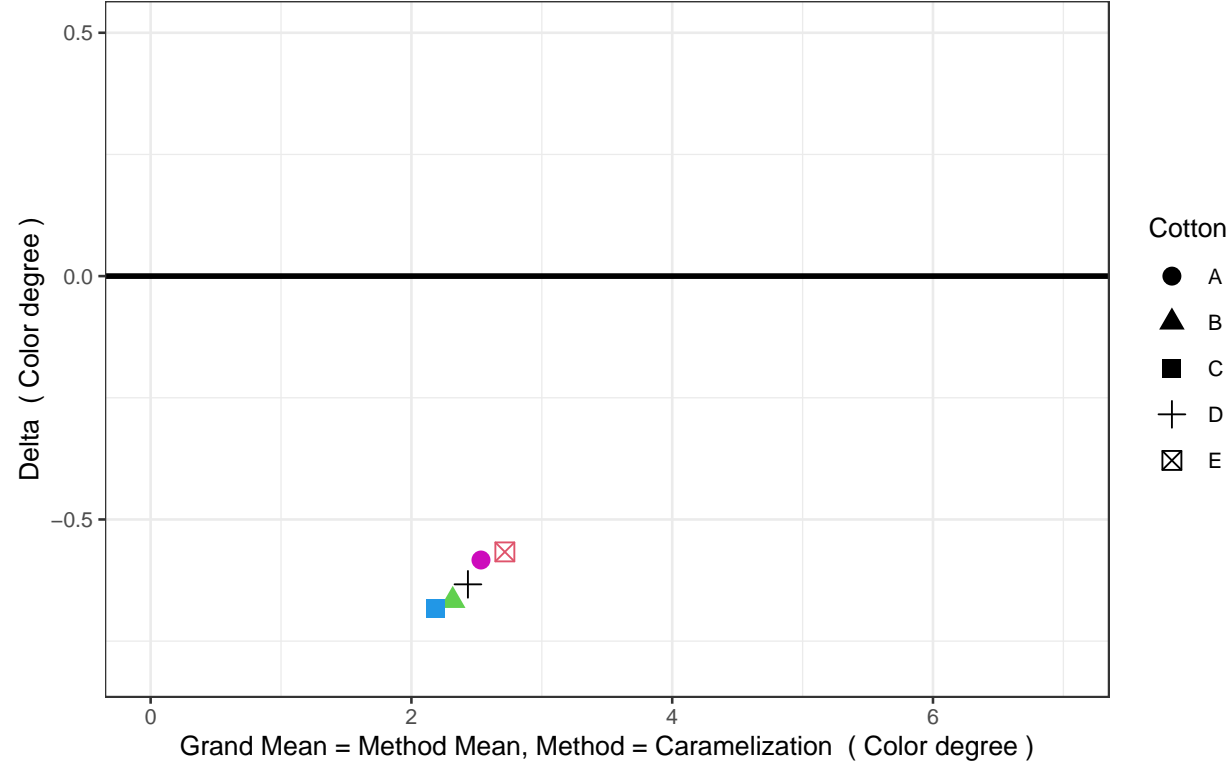
CSITC type chart for Method Caramelization

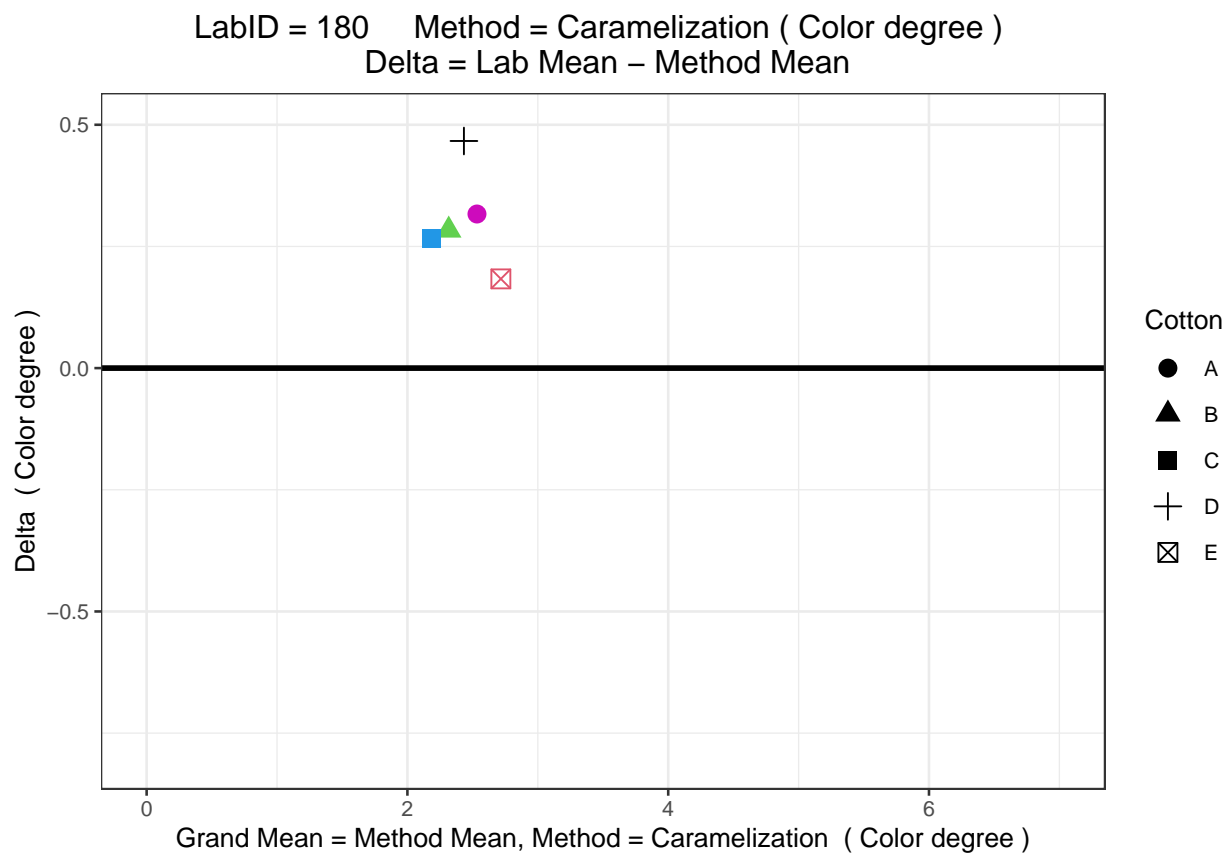


⁶Footnote

* GMean = Grand Mean of all laboratory means, calculated by Method.
* Chart abscissa axis is given in the original individual readings scale.

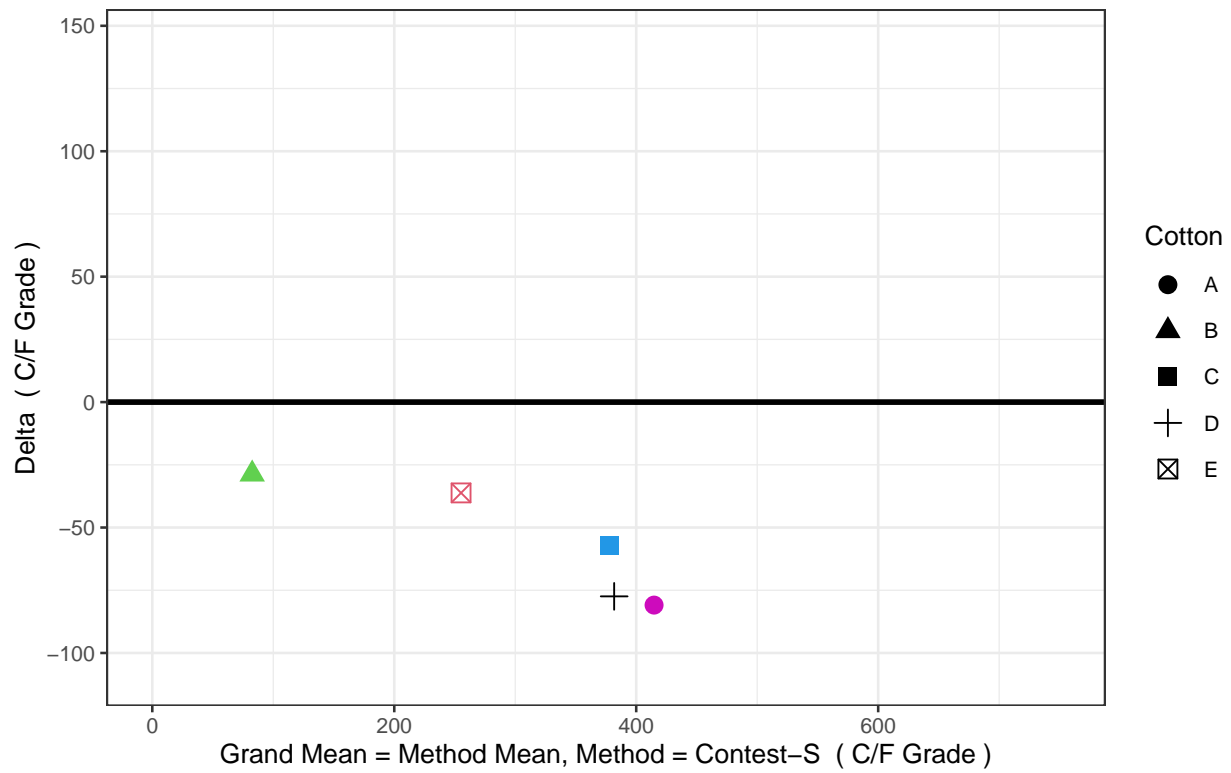
LabID = 105 Method = Caramelization (Color degree)
Delta = Lab Mean – Method Mean

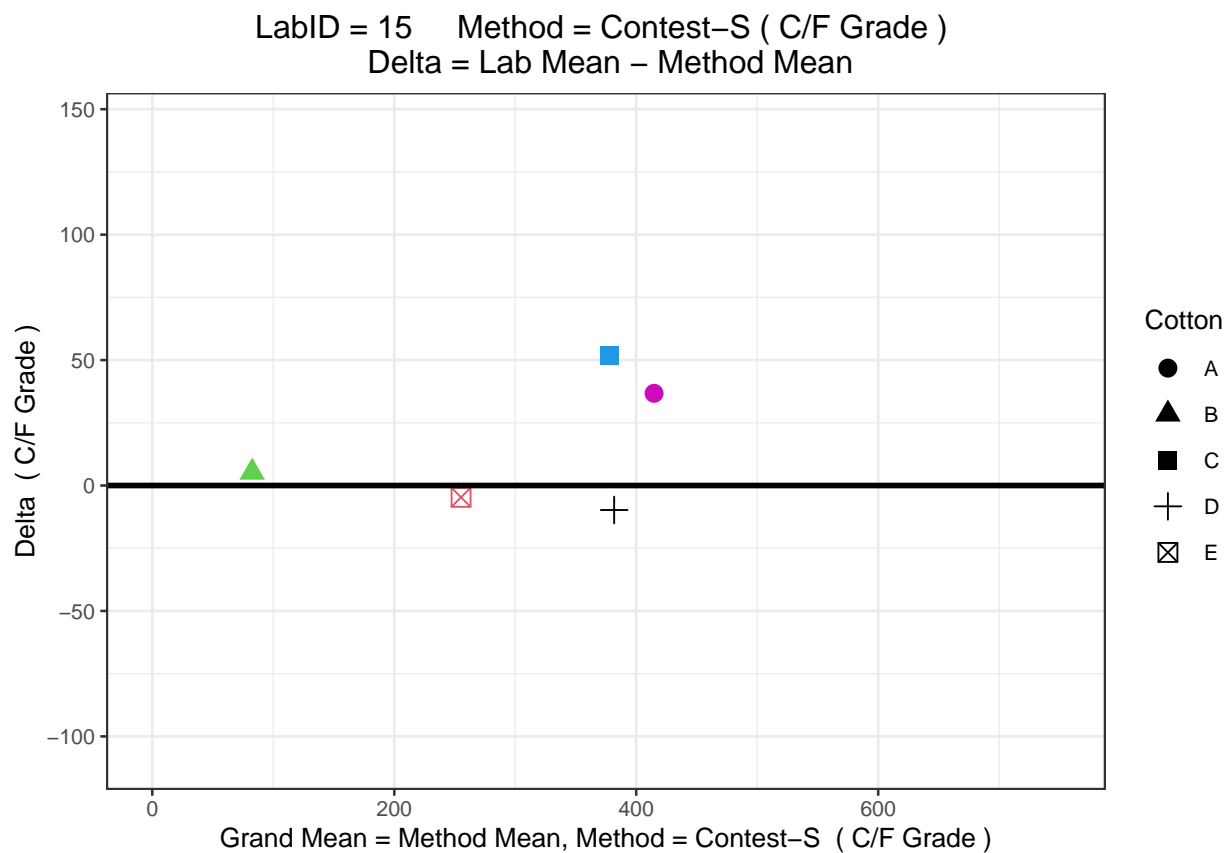


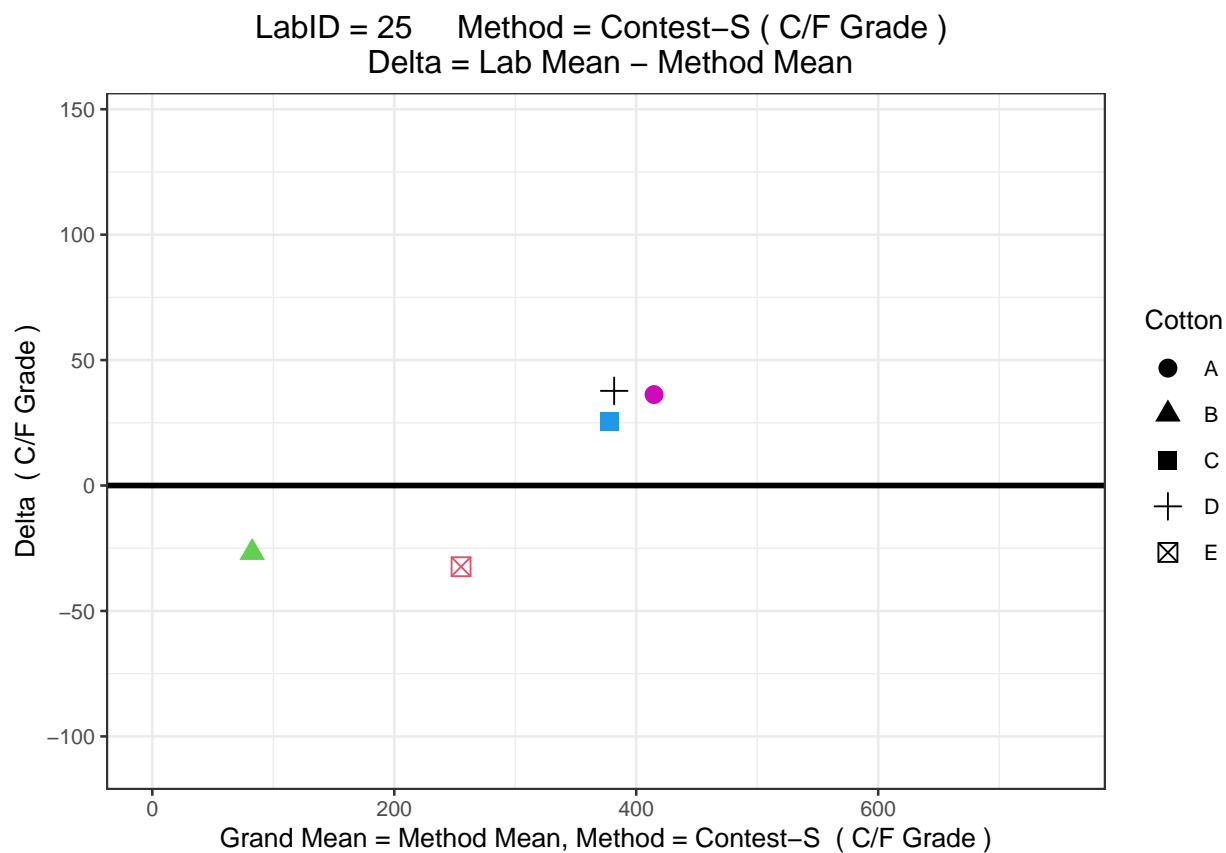


CSITC type chart for Method Contest-S

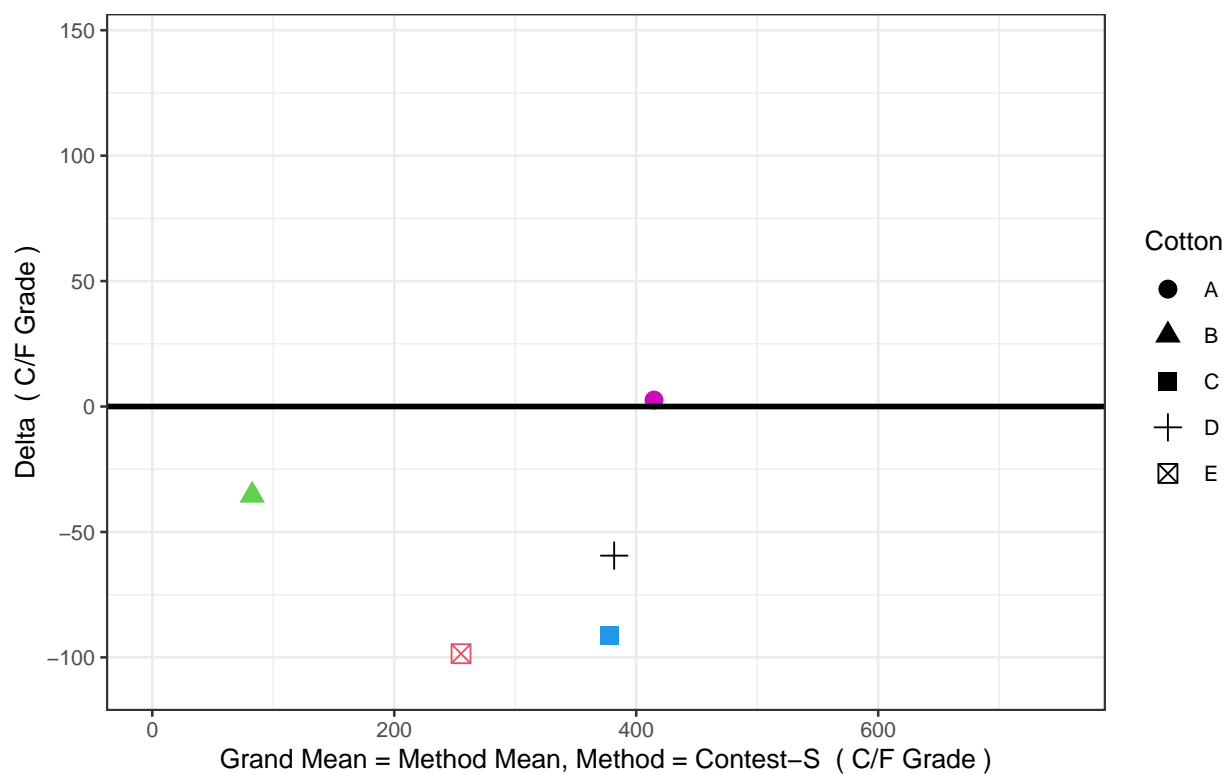
LabID = 5 Method = Contest-S (C/F Grade)
Delta = Lab Mean – Method Mean



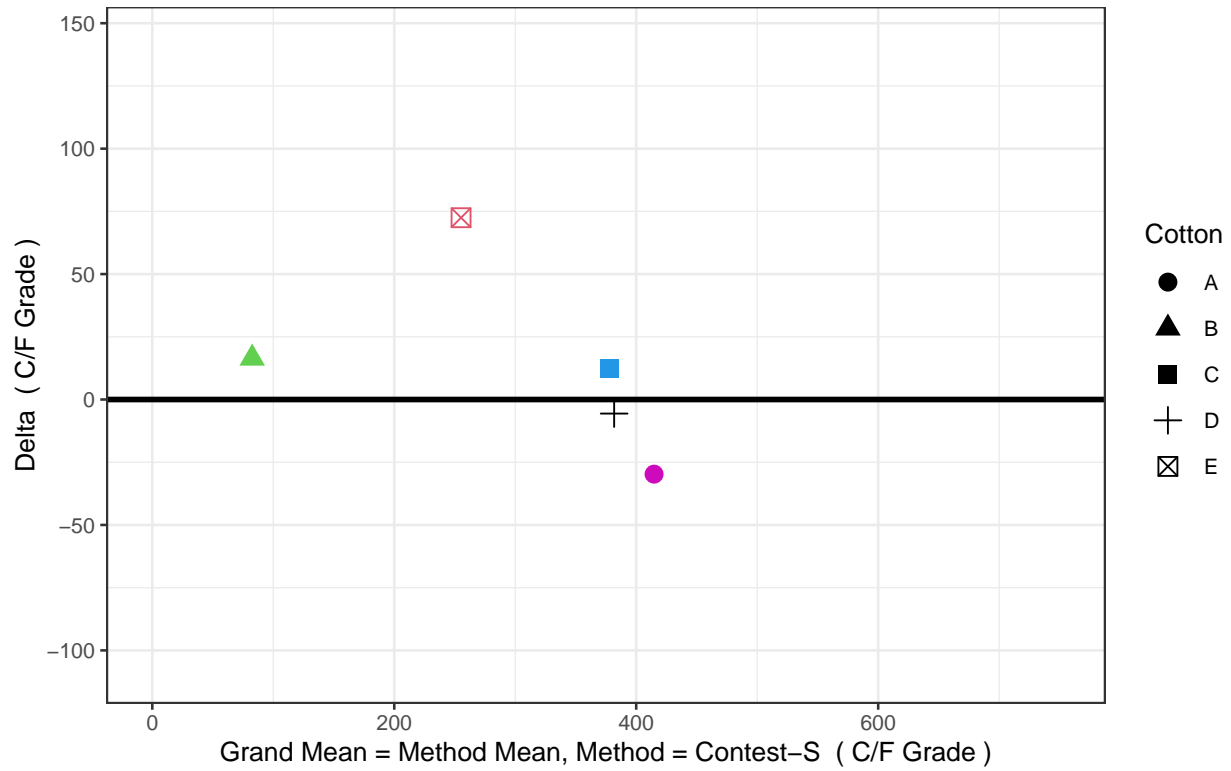




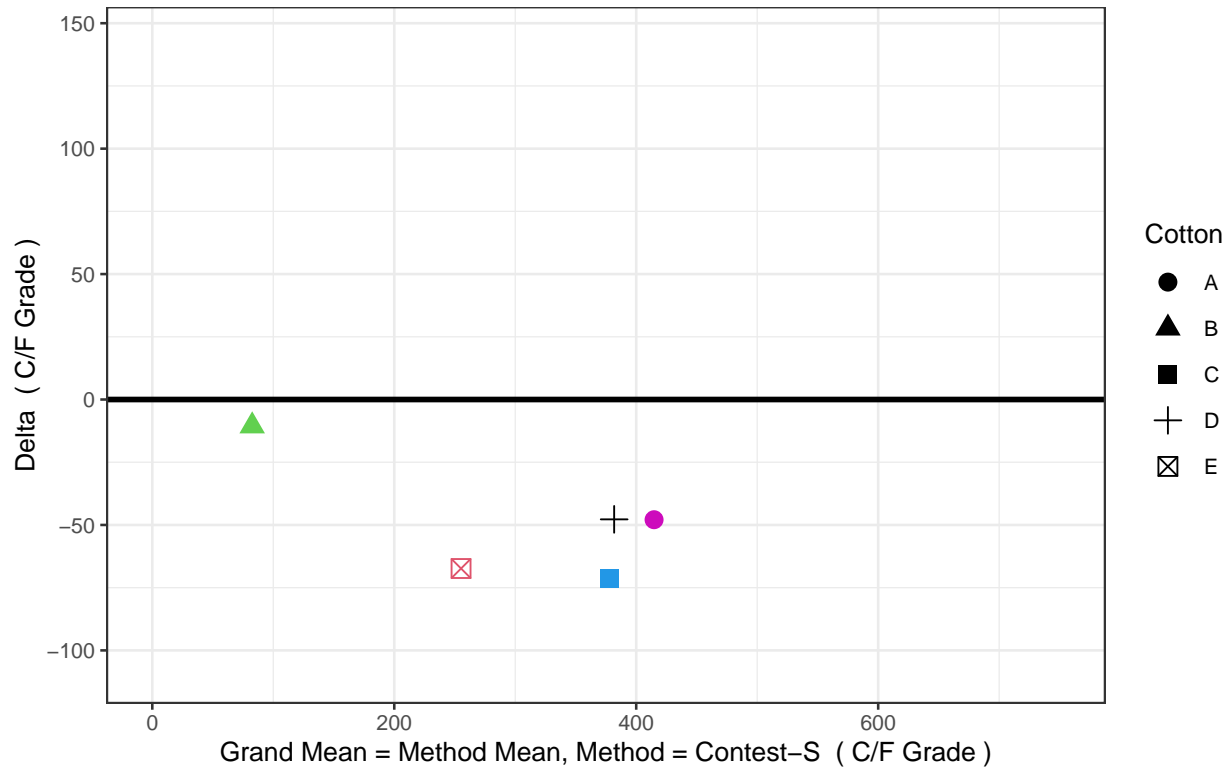
LabID = 35 Method = Contest-S (C/F Grade)
Delta = Lab Mean – Method Mean



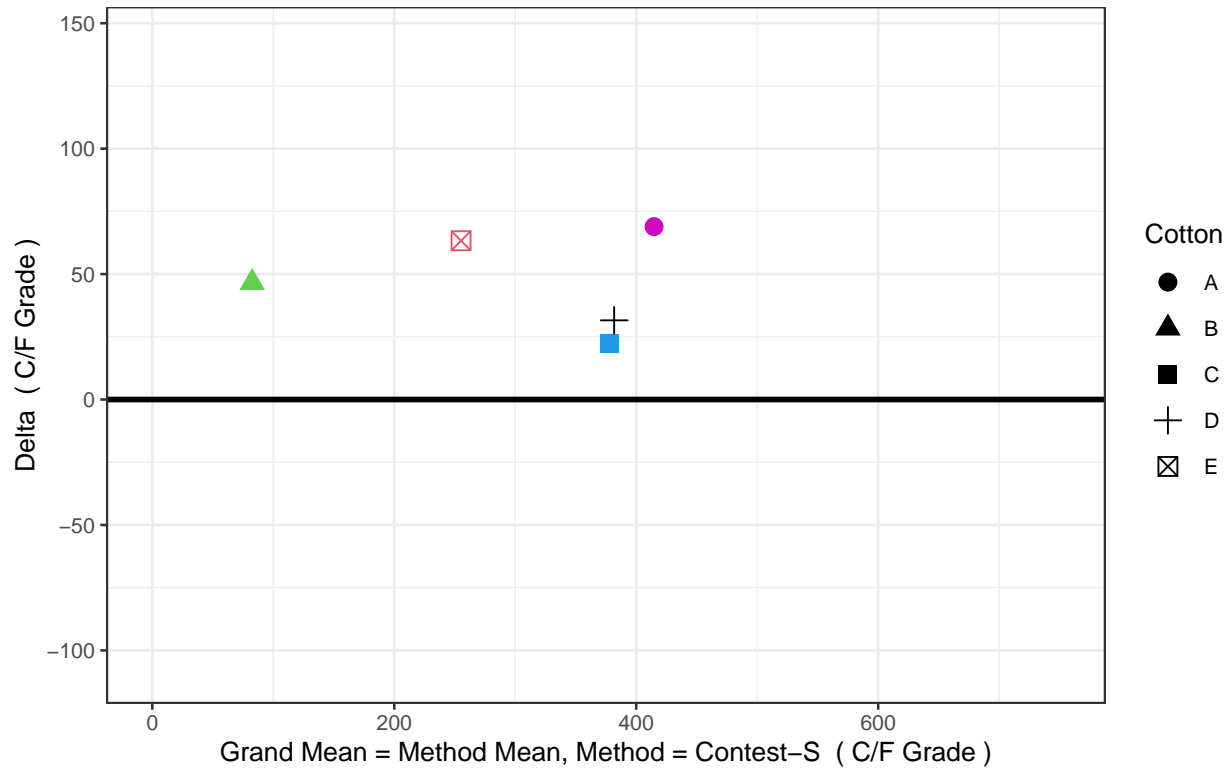
LabID = 115 Method = Contest-S (C/F Grade)
Delta = Lab Mean - Method Mean

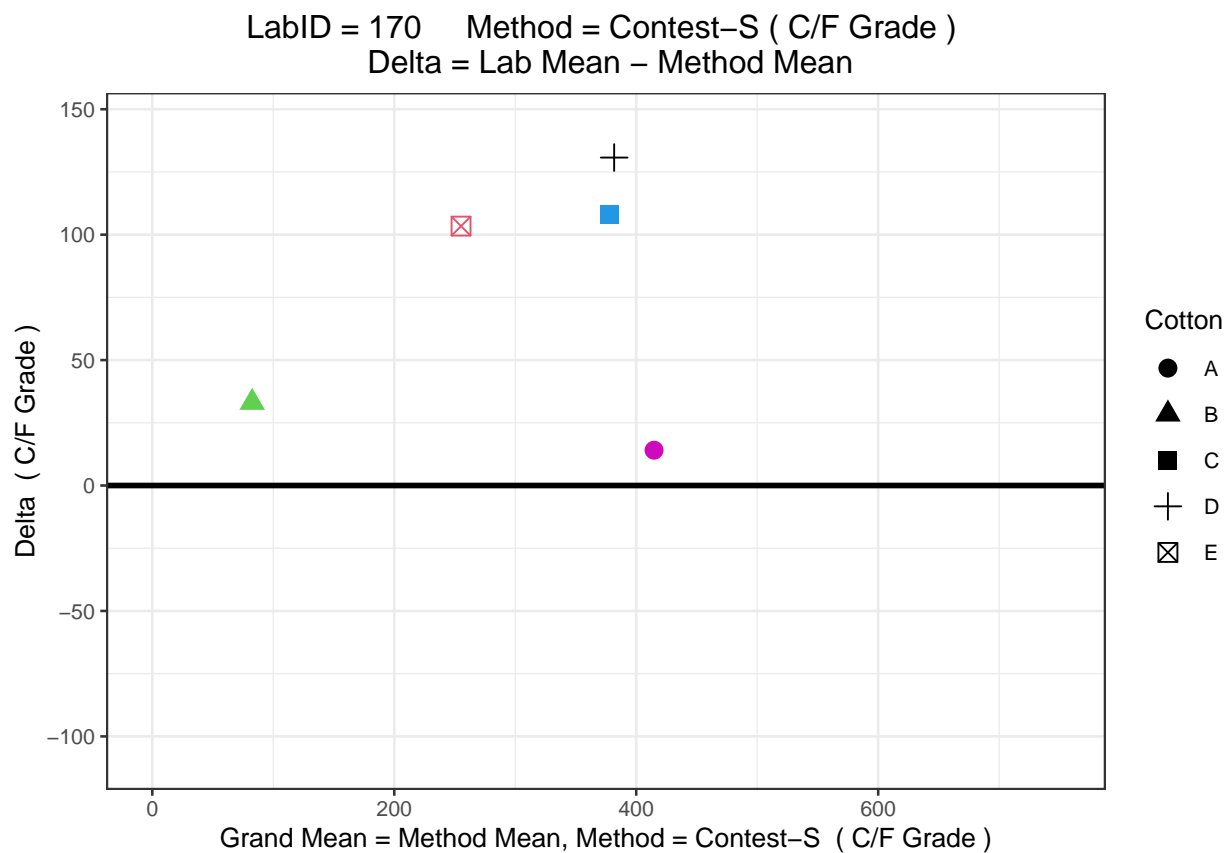


LabID = 135 Method = Contest-S (C/F Grade)
Delta = Lab Mean – Method Mean

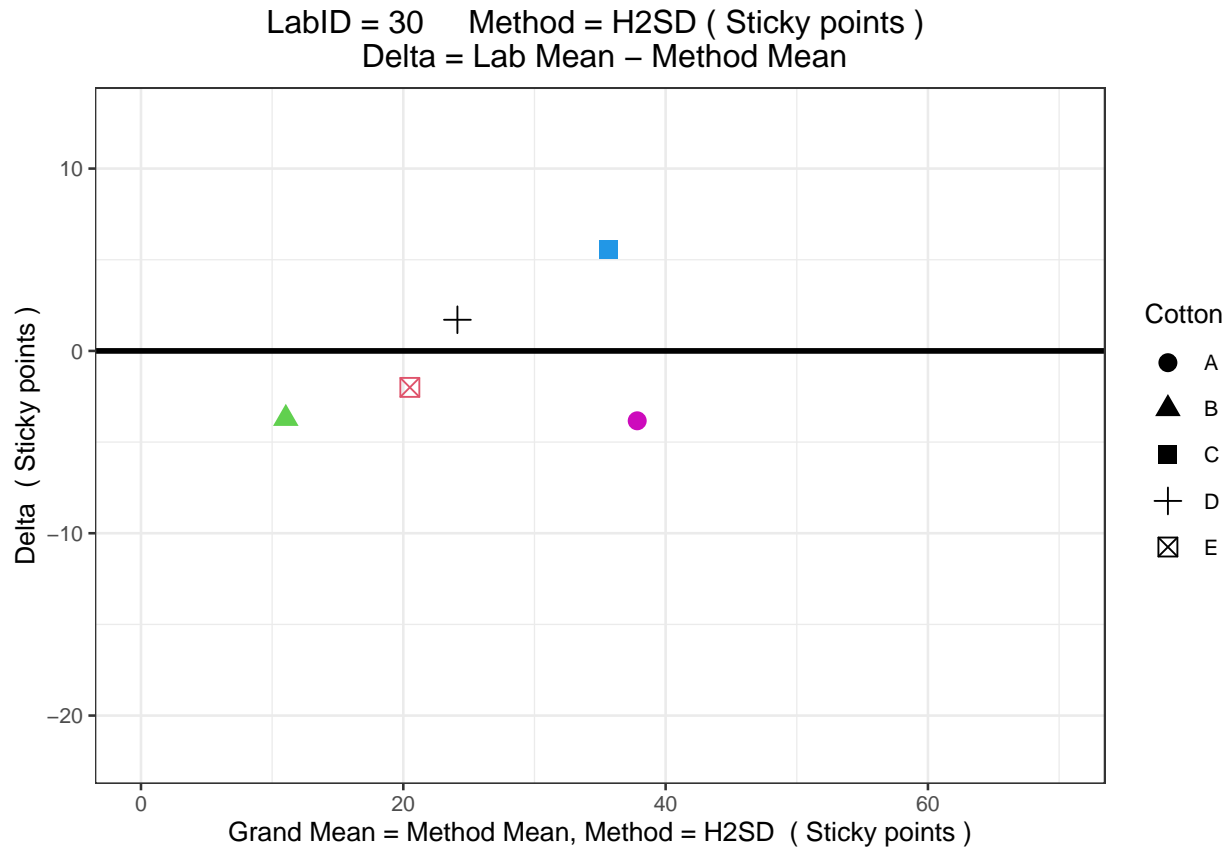


LabID = 155 Method = Contest-S (C/F Grade)
Delta = Lab Mean - Method Mean

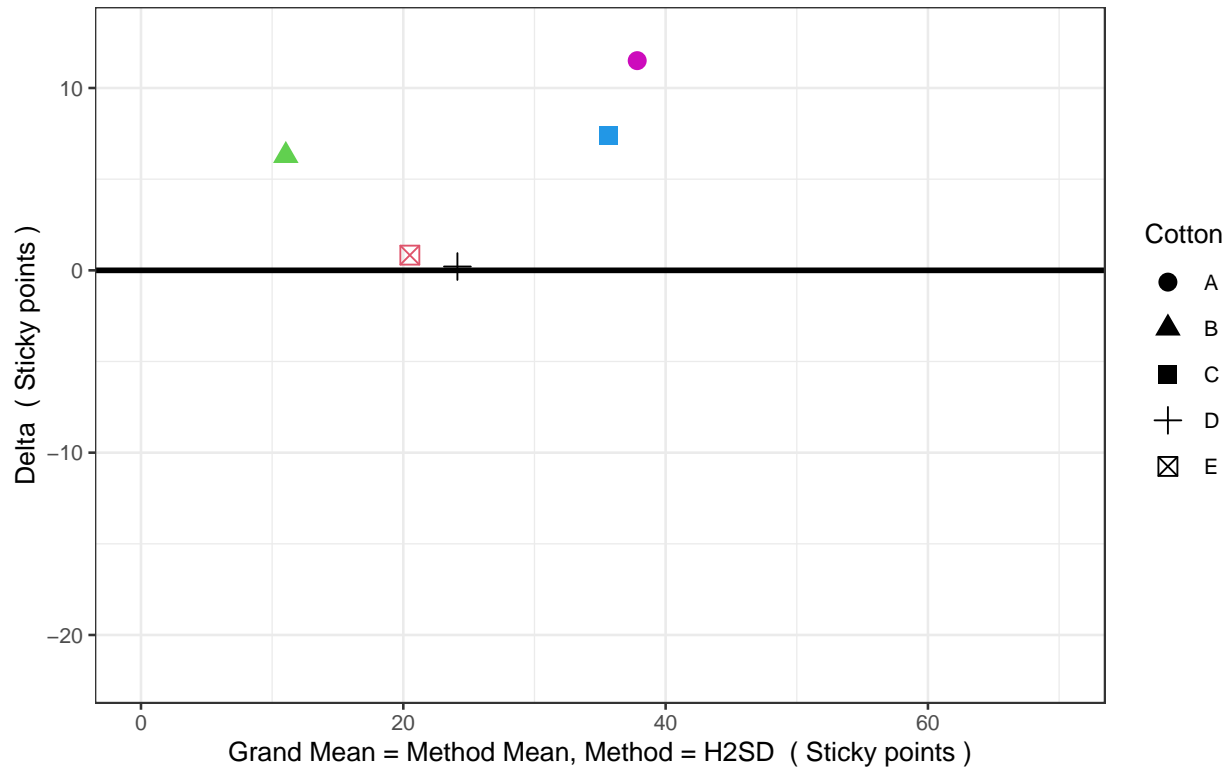




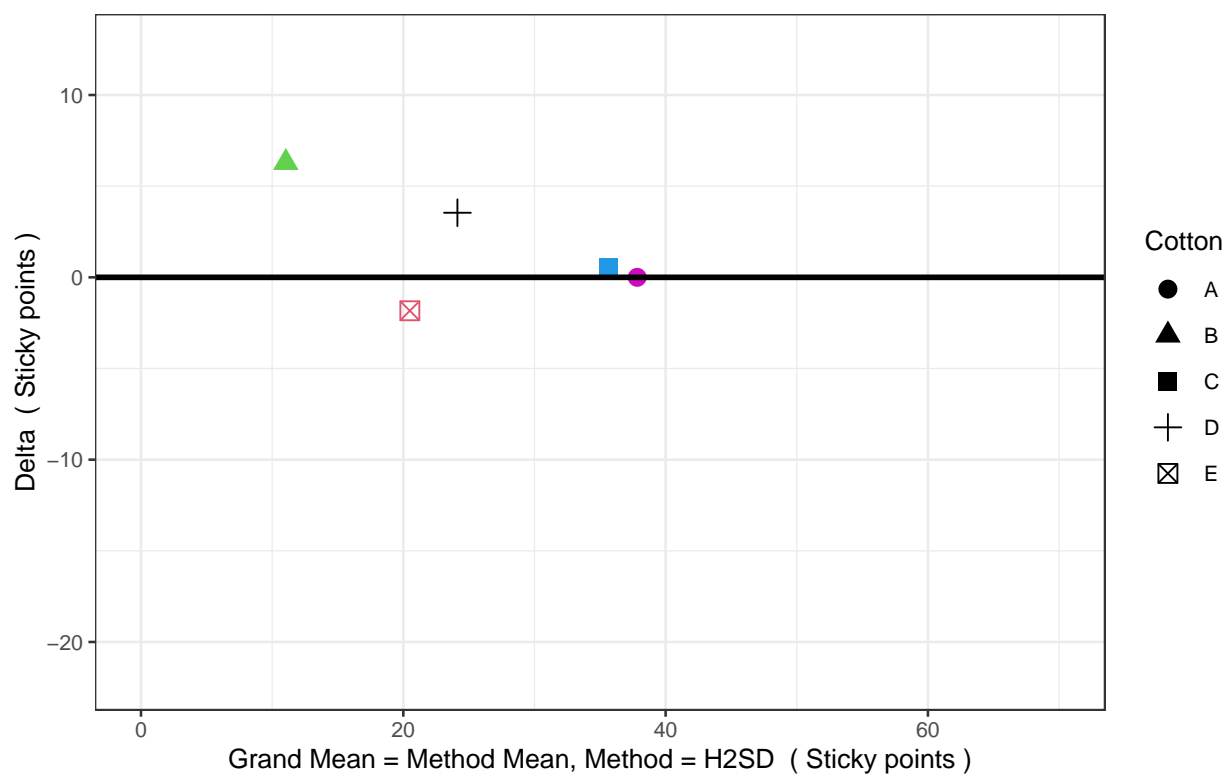
CSITC type chart for Method H2SD



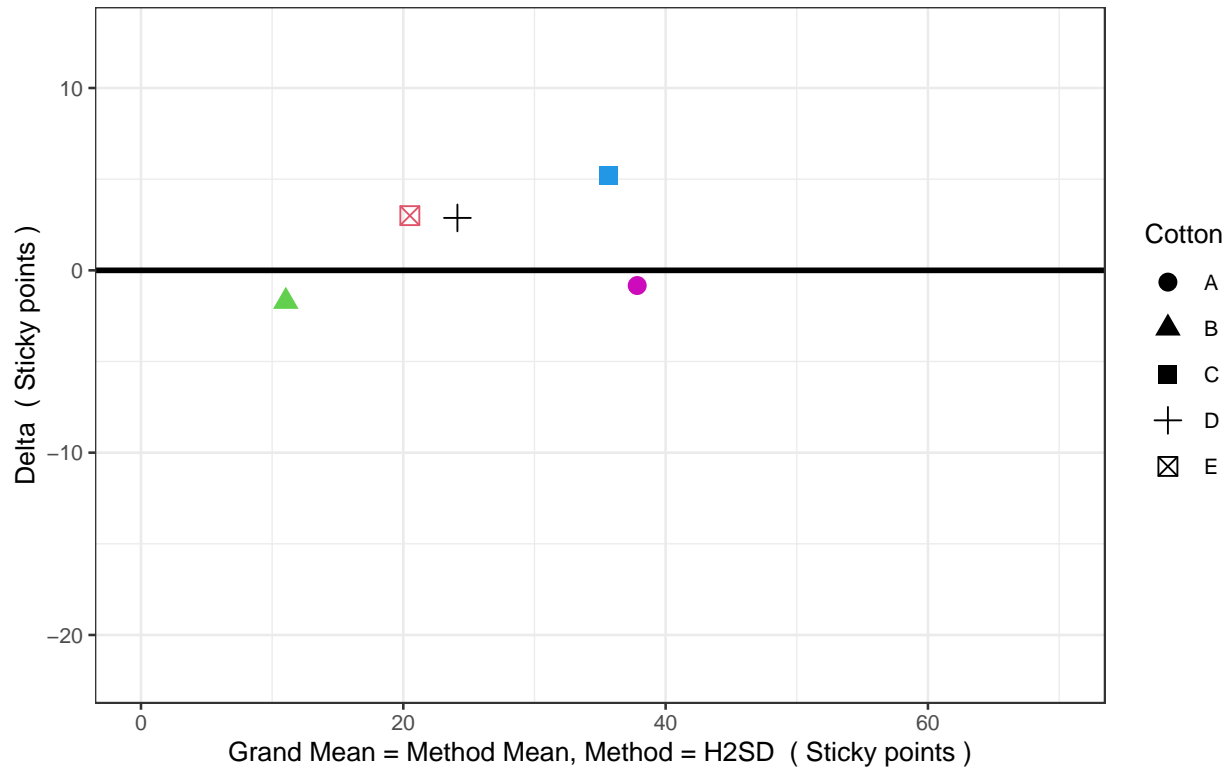
LabID = 55 Method = H2SD (Sticky points)
Delta = Lab Mean - Method Mean



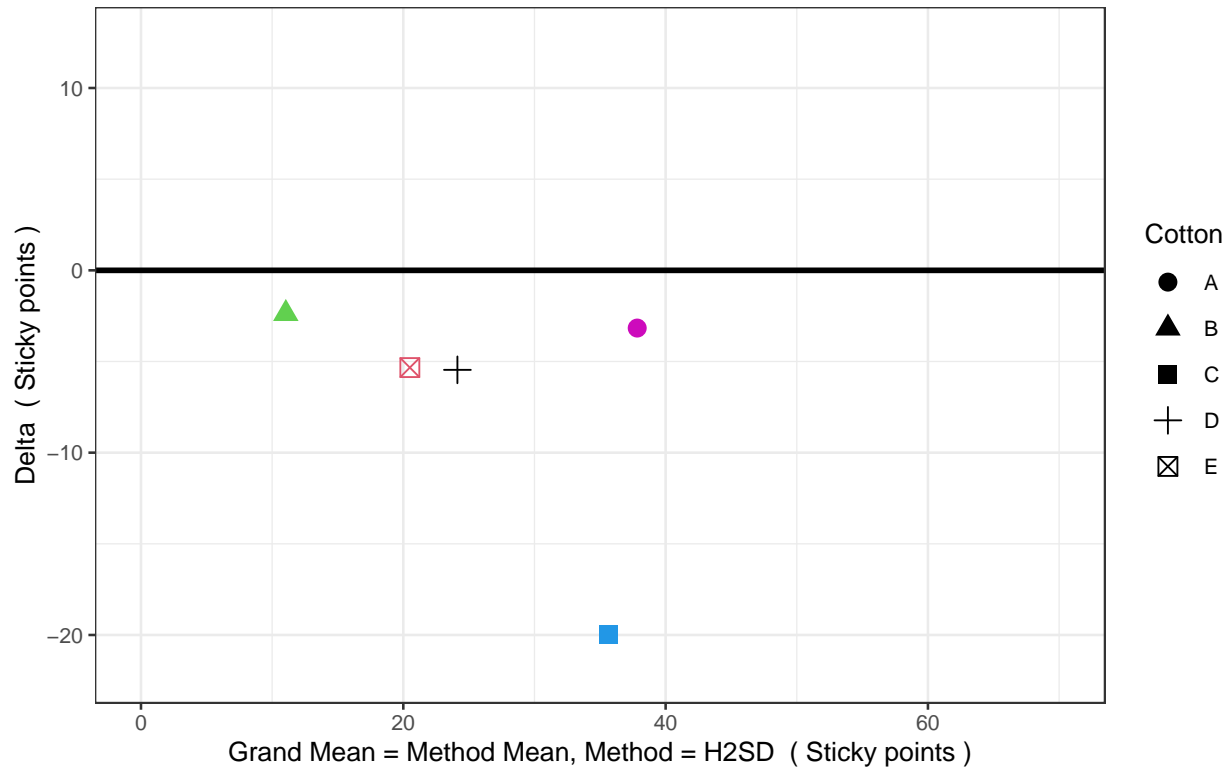
LabID = 70 Method = H2SD (Sticky points)
Delta = Lab Mean – Method Mean



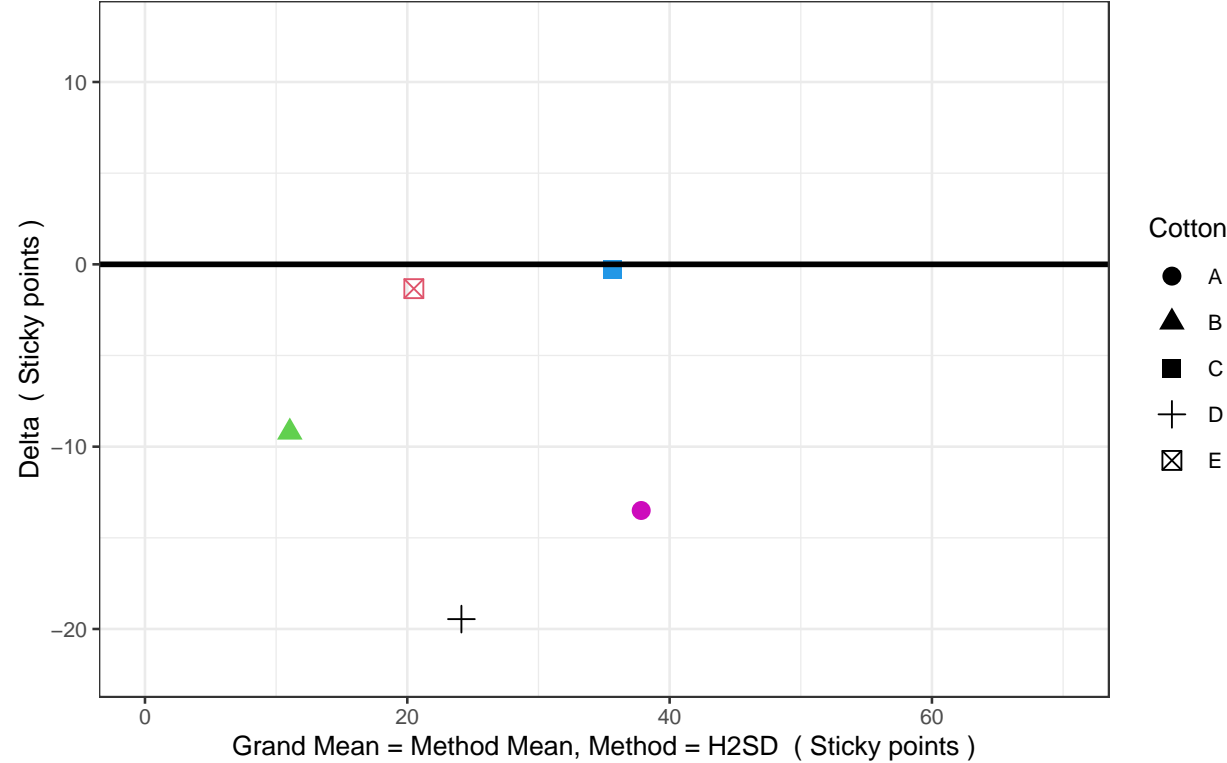
LabID = 85 Method = H2SD (Sticky points)
Delta = Lab Mean – Method Mean



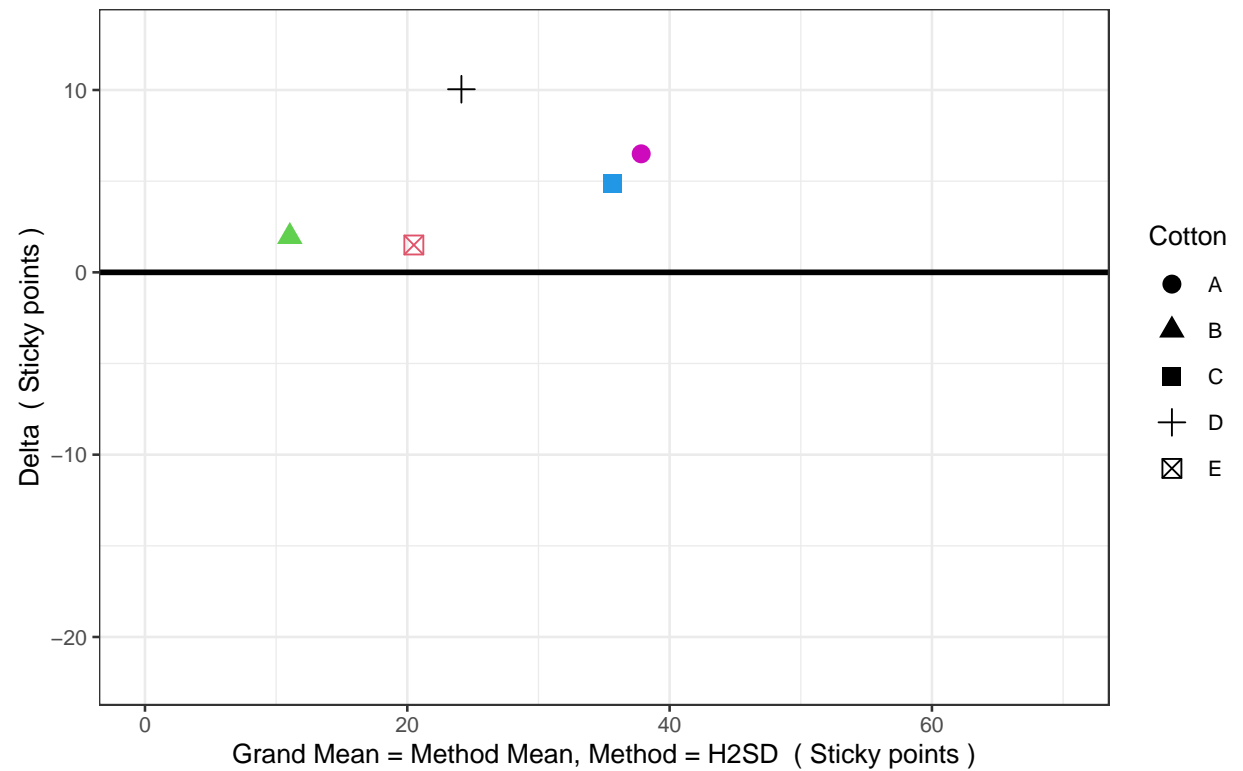
LabID = 95 Method = H2SD (Sticky points)
Delta = Lab Mean – Method Mean



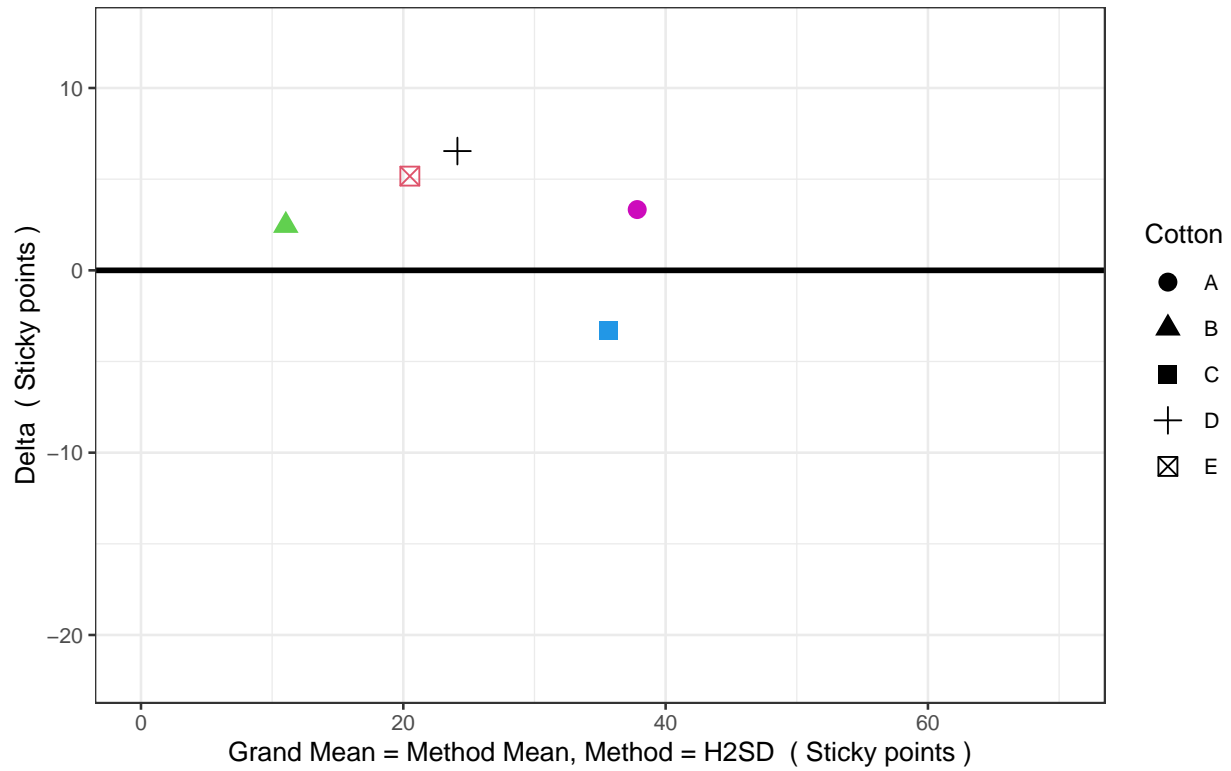
LabID = 110 Method = H2SD (Sticky points)
Delta = Lab Mean – Method Mean



LabID = 150 Method = H2SD (Sticky points)
Delta = Lab Mean – Method Mean



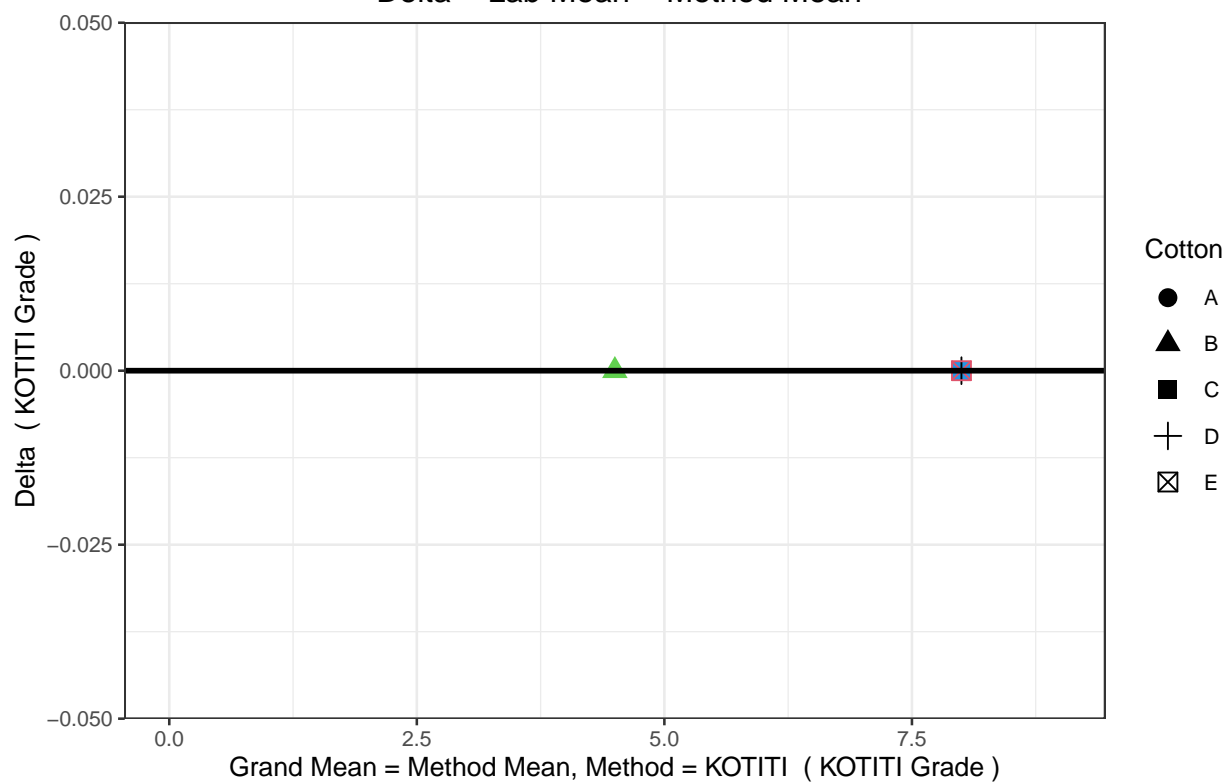
LabID = 165 Method = H2SD (Sticky points)
Delta = Lab Mean – Method Mean



CSITC type chart for Method KOTITI

LabID = 75 Method = KOTITI (KOTITI Grade)

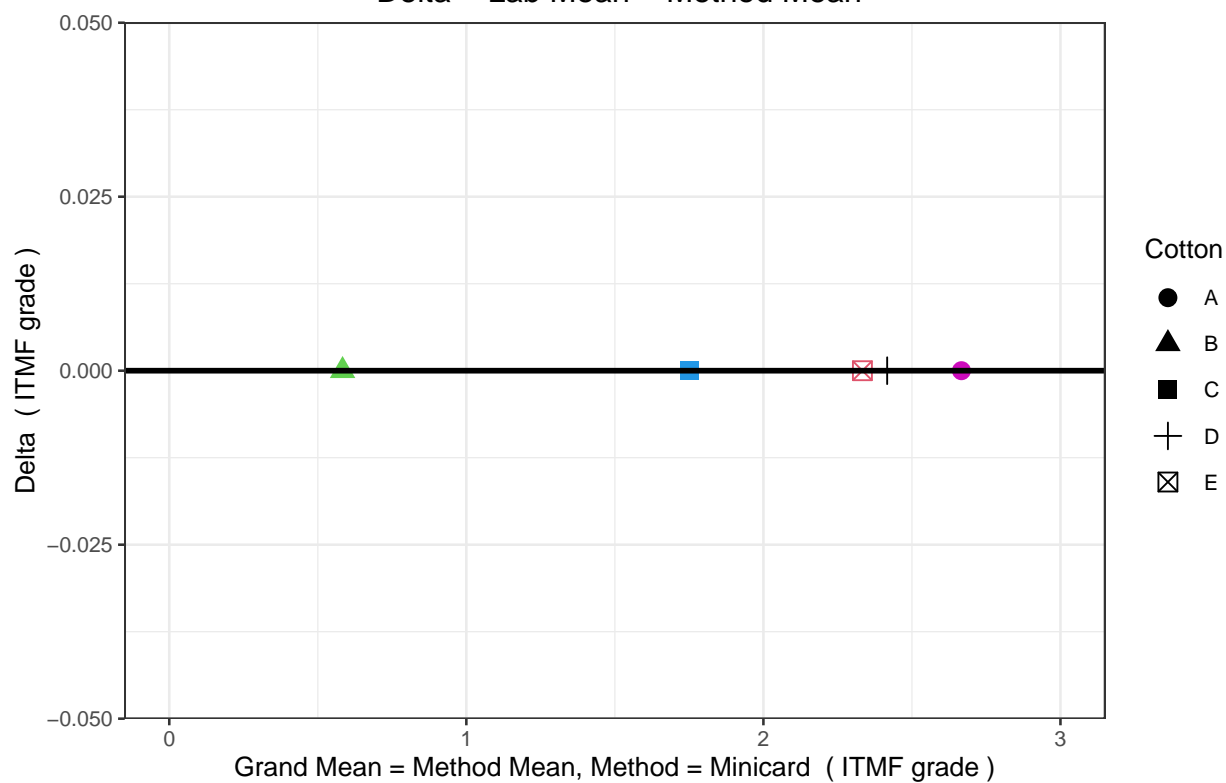
Delta = Lab Mean – Method Mean



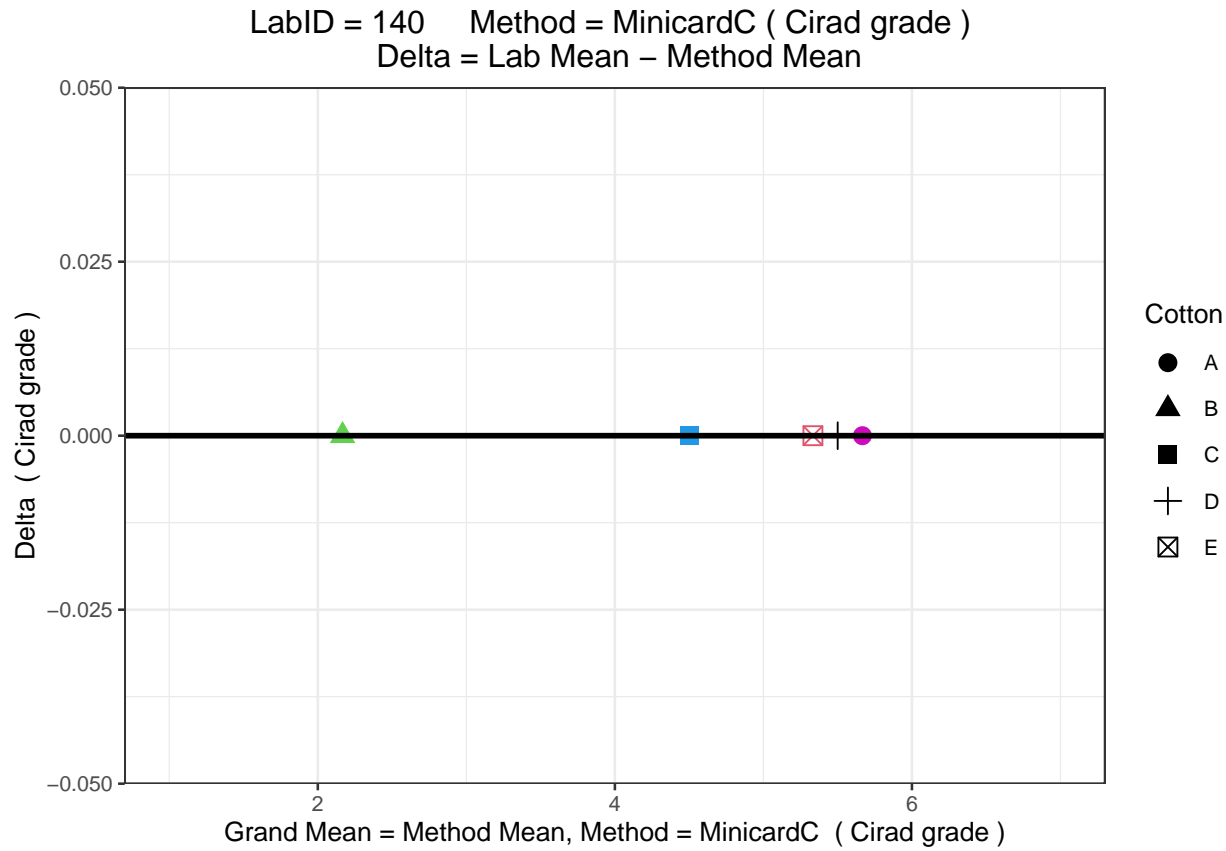
CSITC type chart for Method Minicard

LabID = 45 Method = Minicard (ITMF grade)

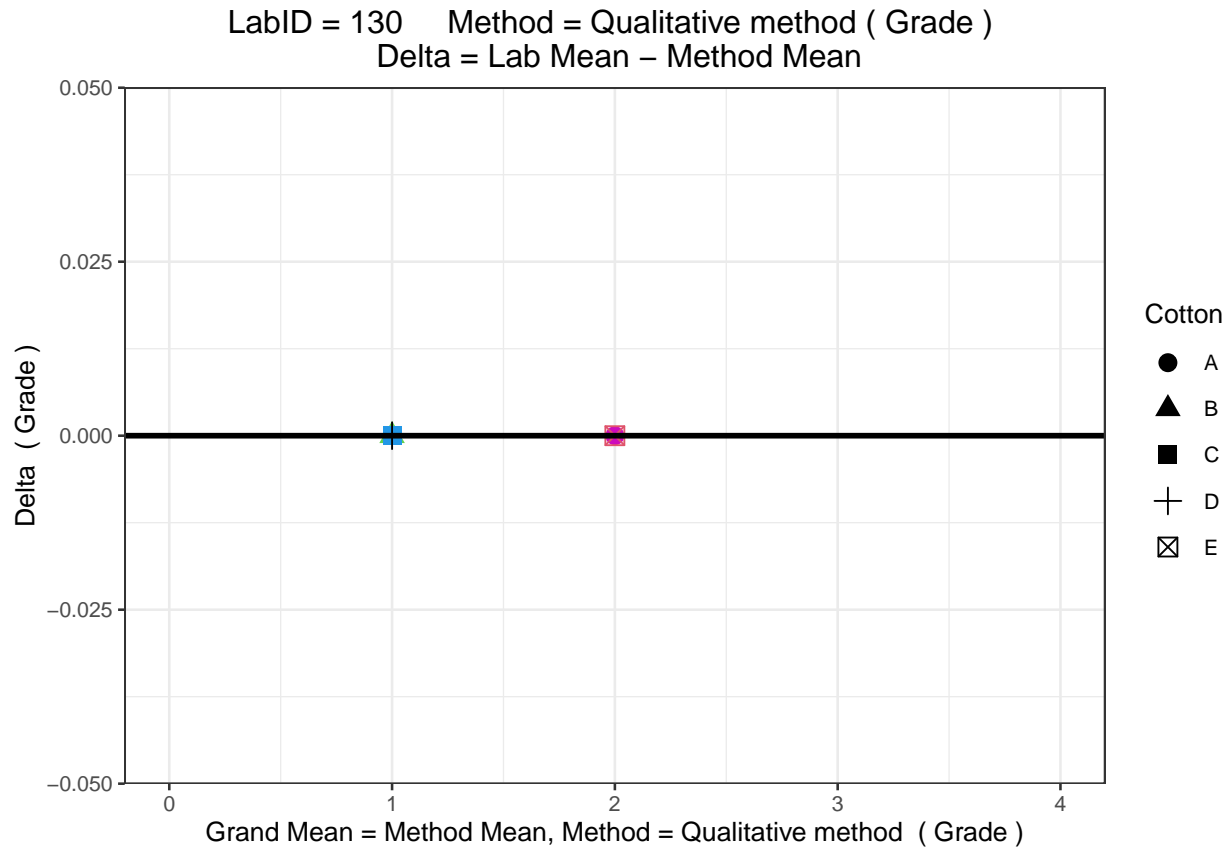
Delta = Lab Mean – Method Mean



CSITC type chart for Method MinicardC



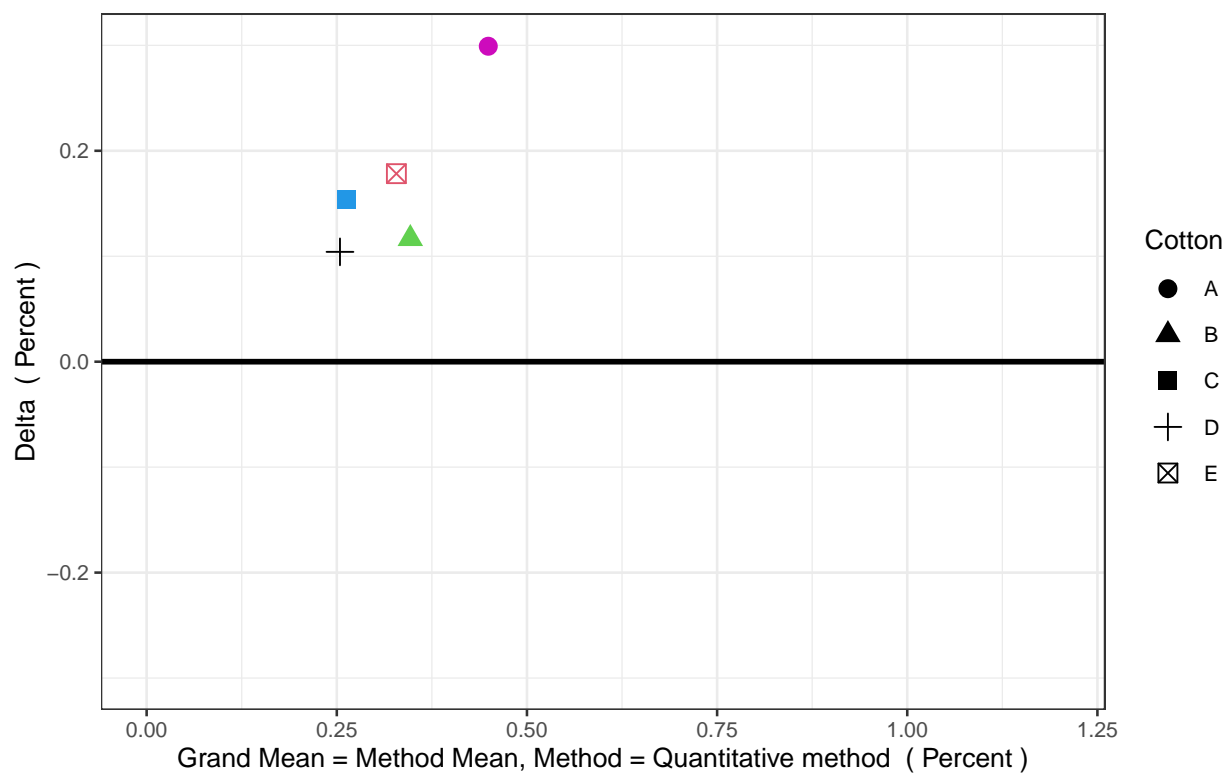
CSITC type chart for Method Qualitative method



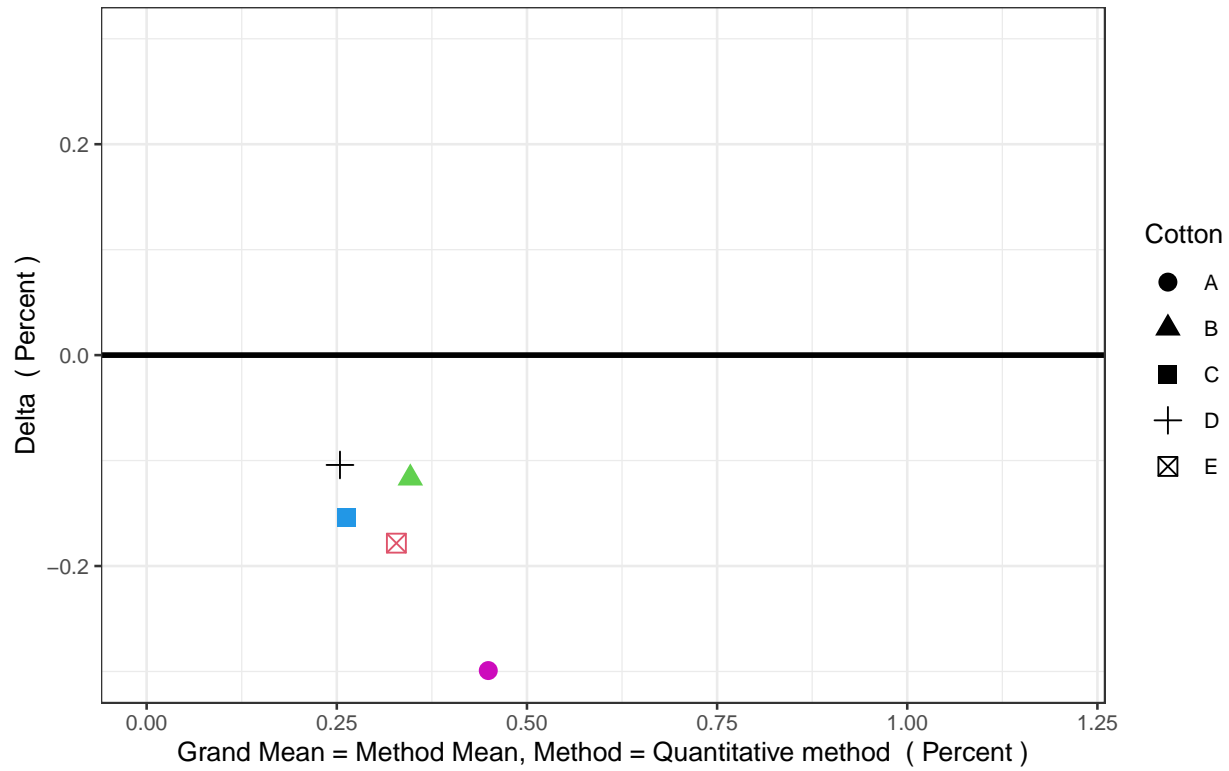
CSITC type chart for Method Quantitative method

LabID = 10 Method = Quantitative method (Percent)

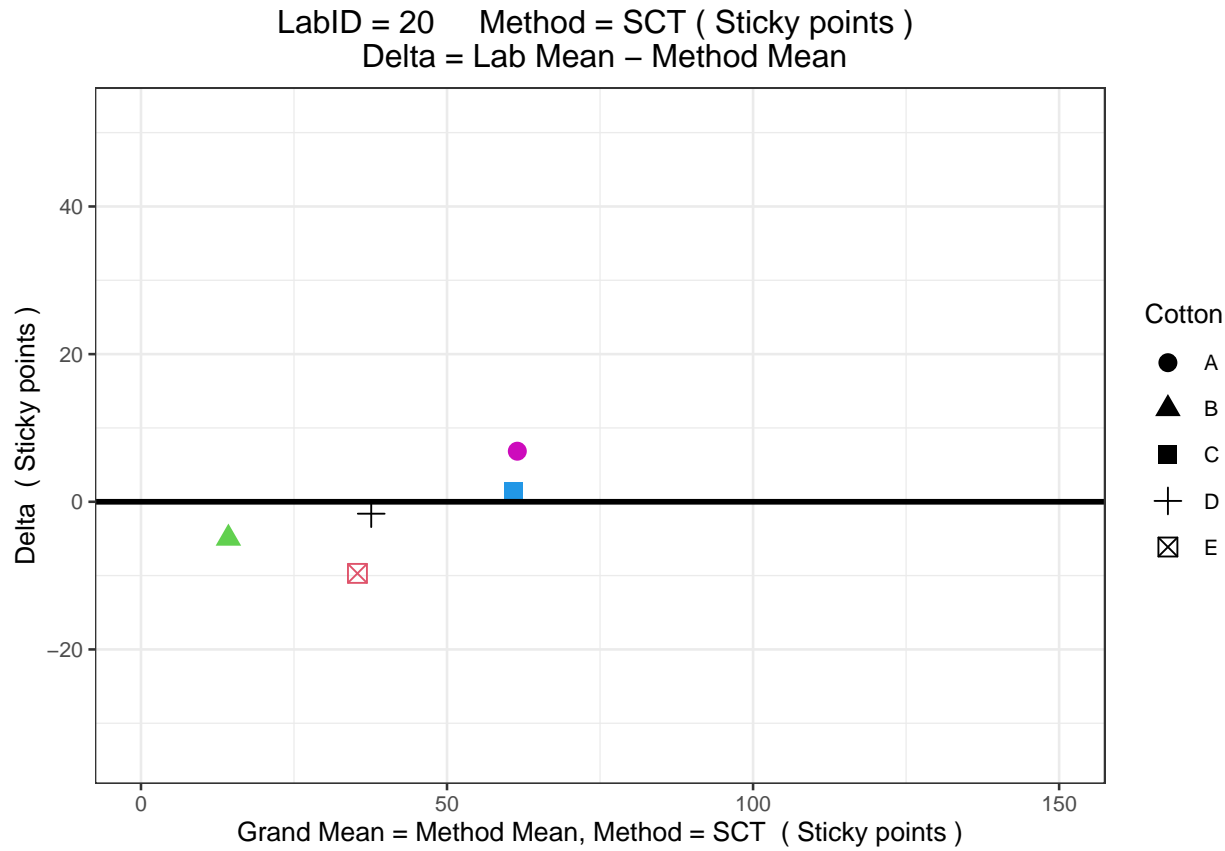
Delta = Lab Mean – Method Mean



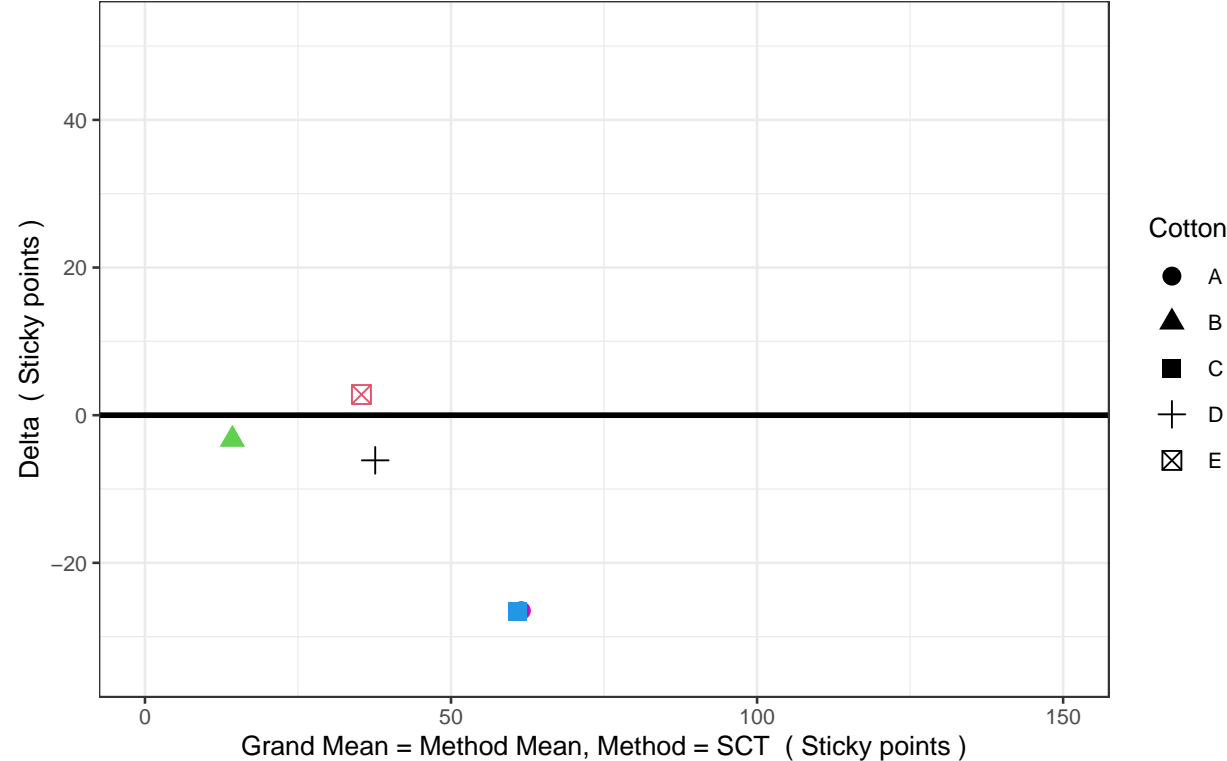
LabID = 80 Method = Quantitative method (Percent)
Delta = Lab Mean – Method Mean



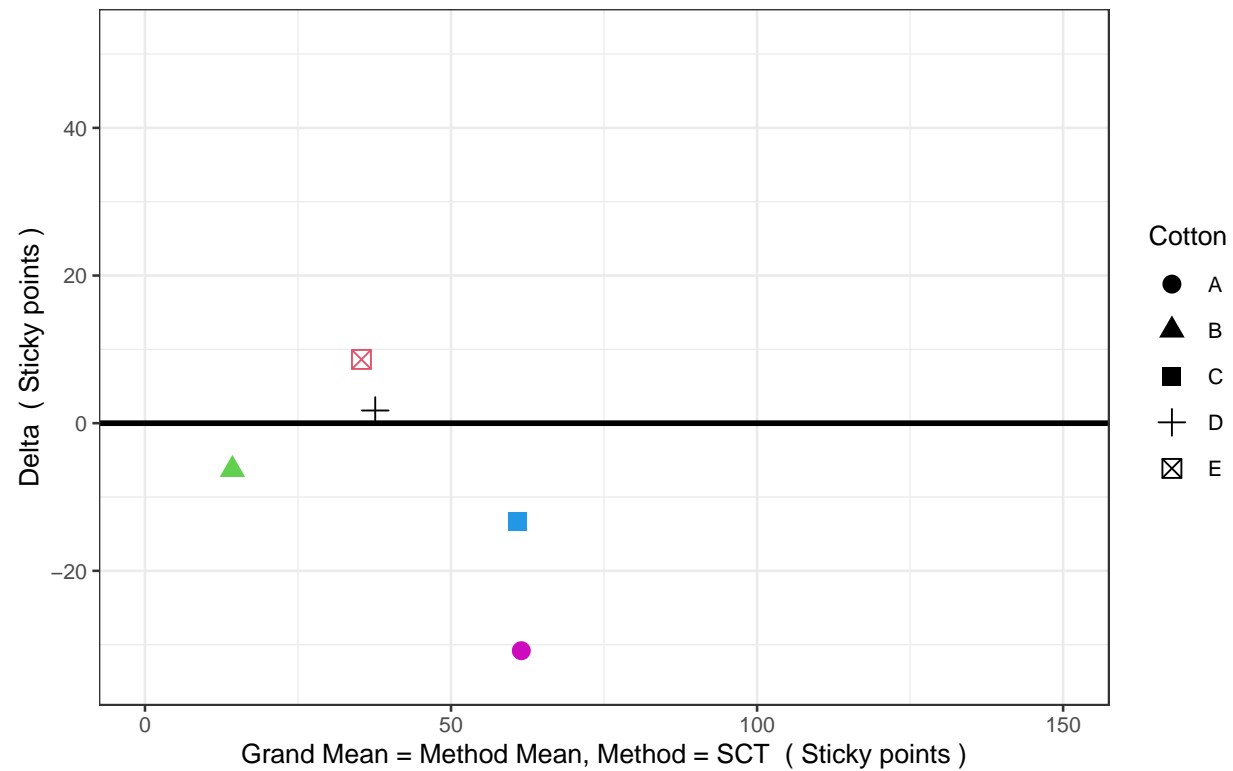
CSITC type chart for Method SCT



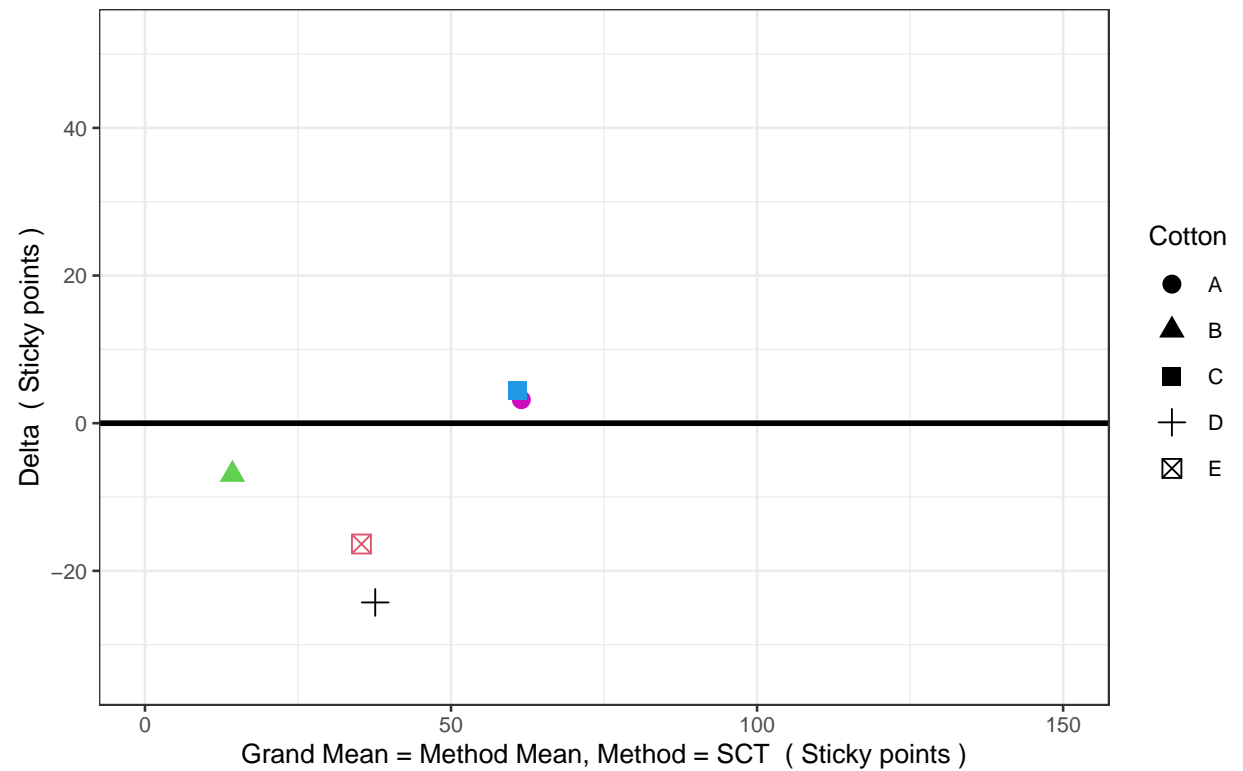
LabID = 50 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



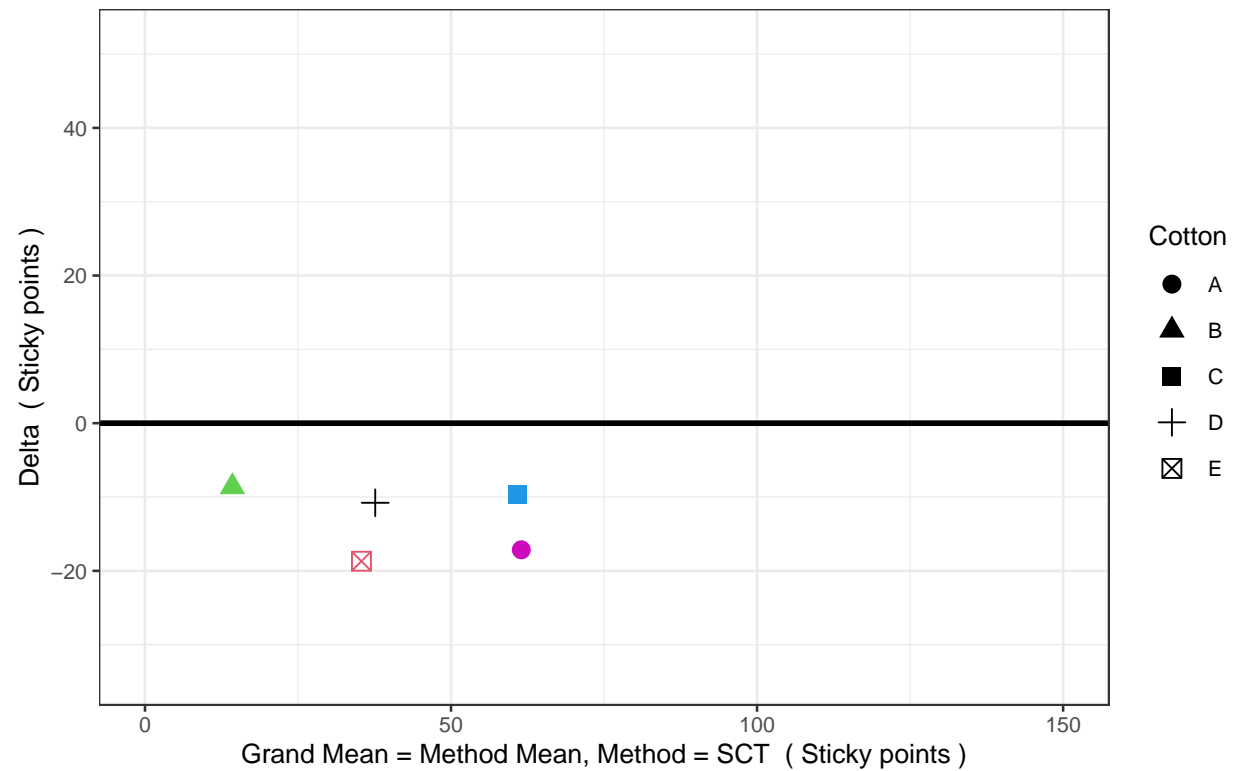
LabID = 60 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



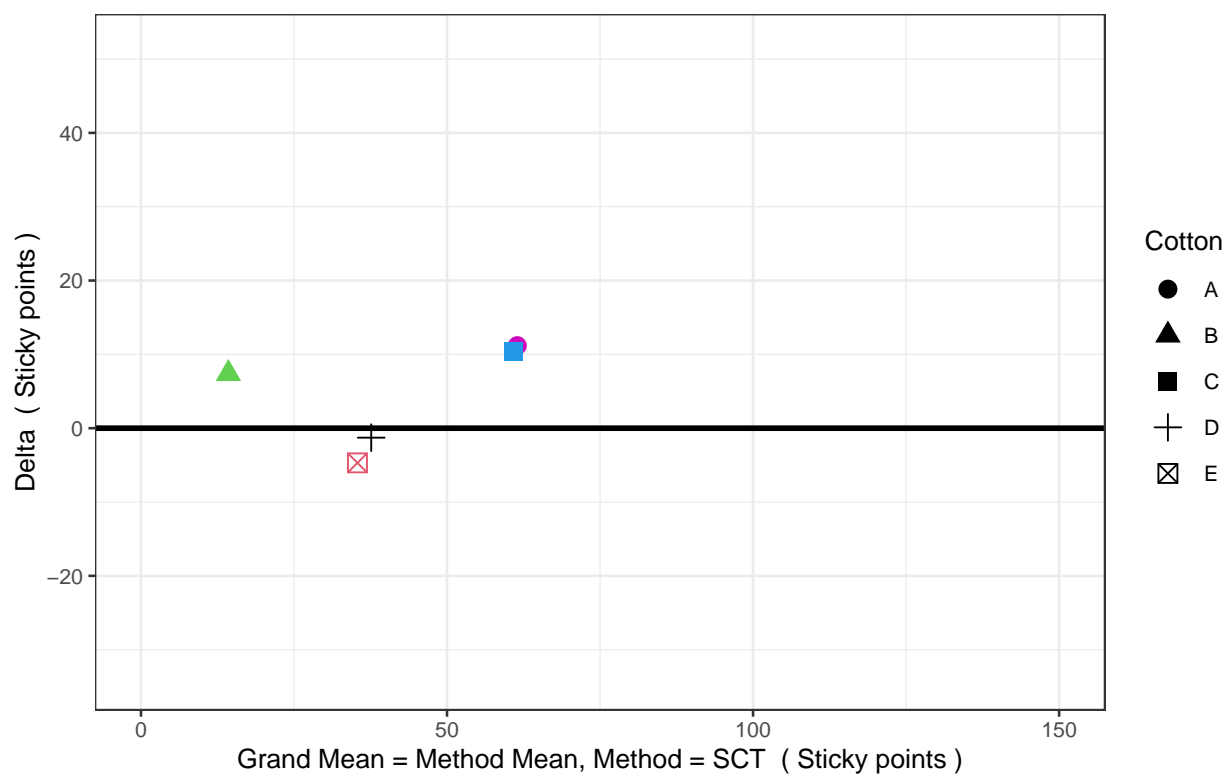
LabID = 65 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



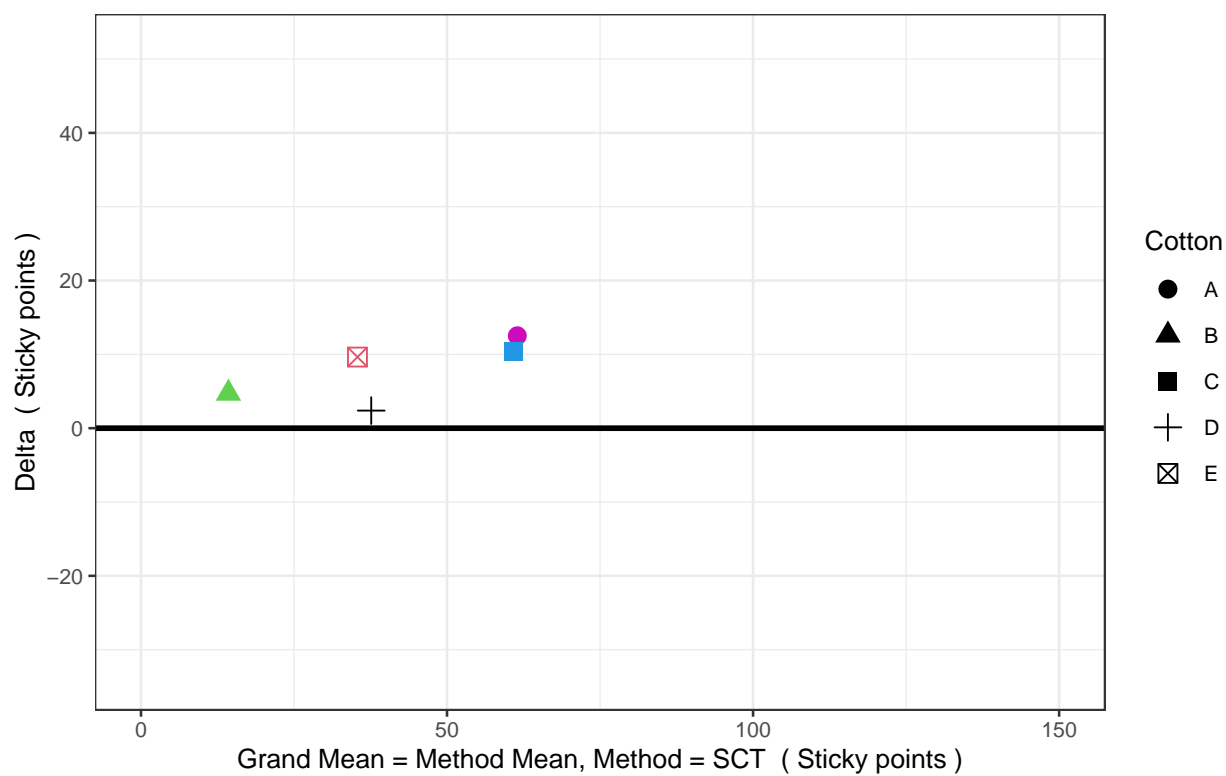
LabID = 90 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



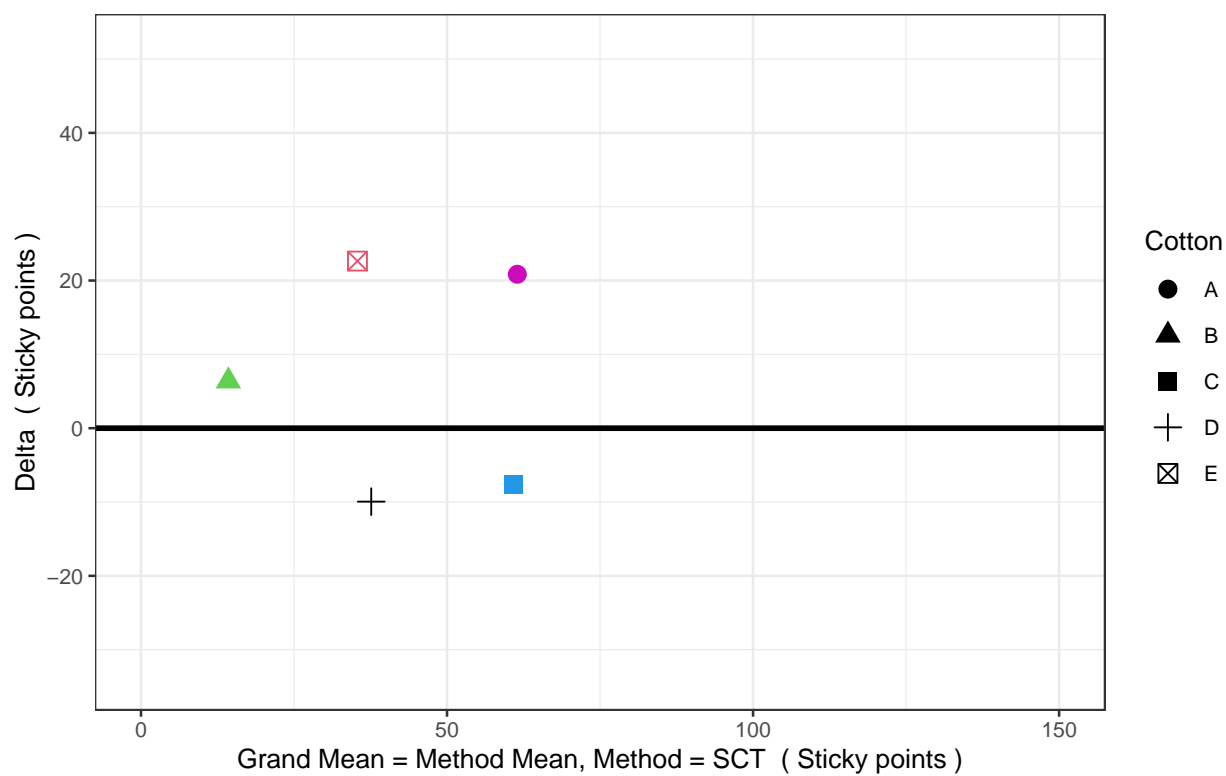
LabID = 100 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



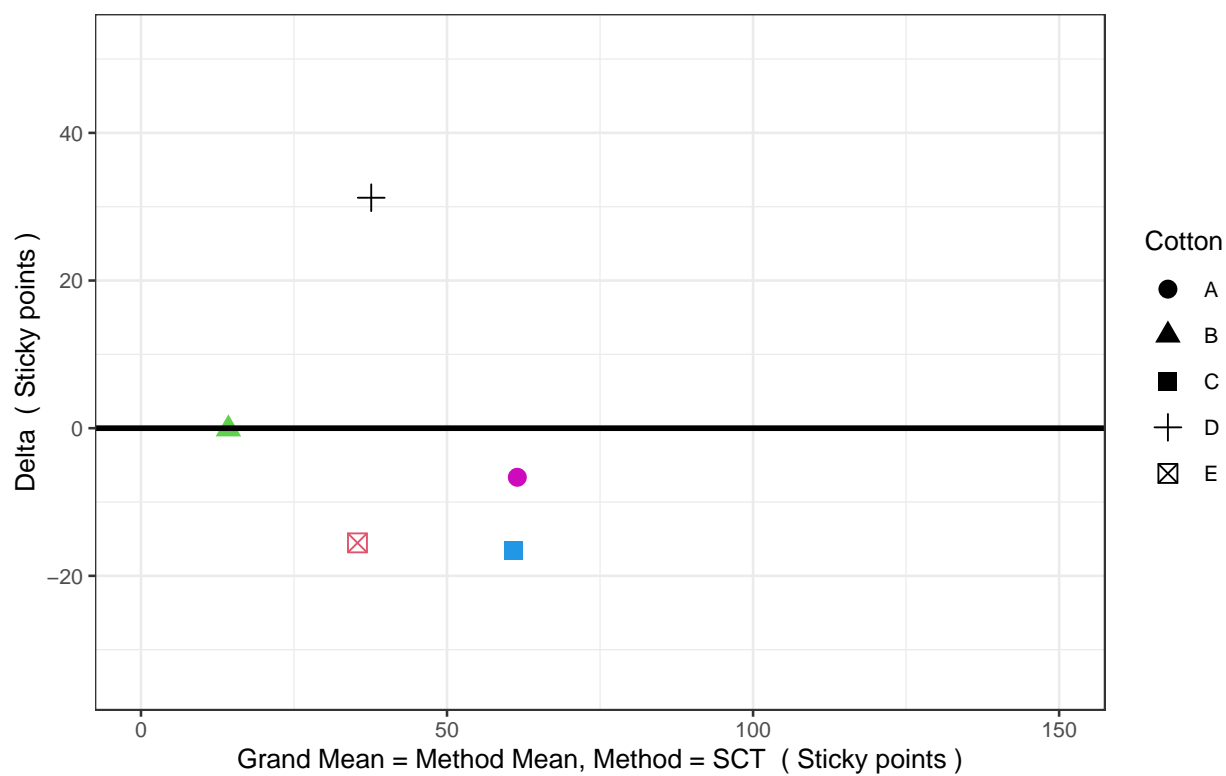
LabID = 120 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



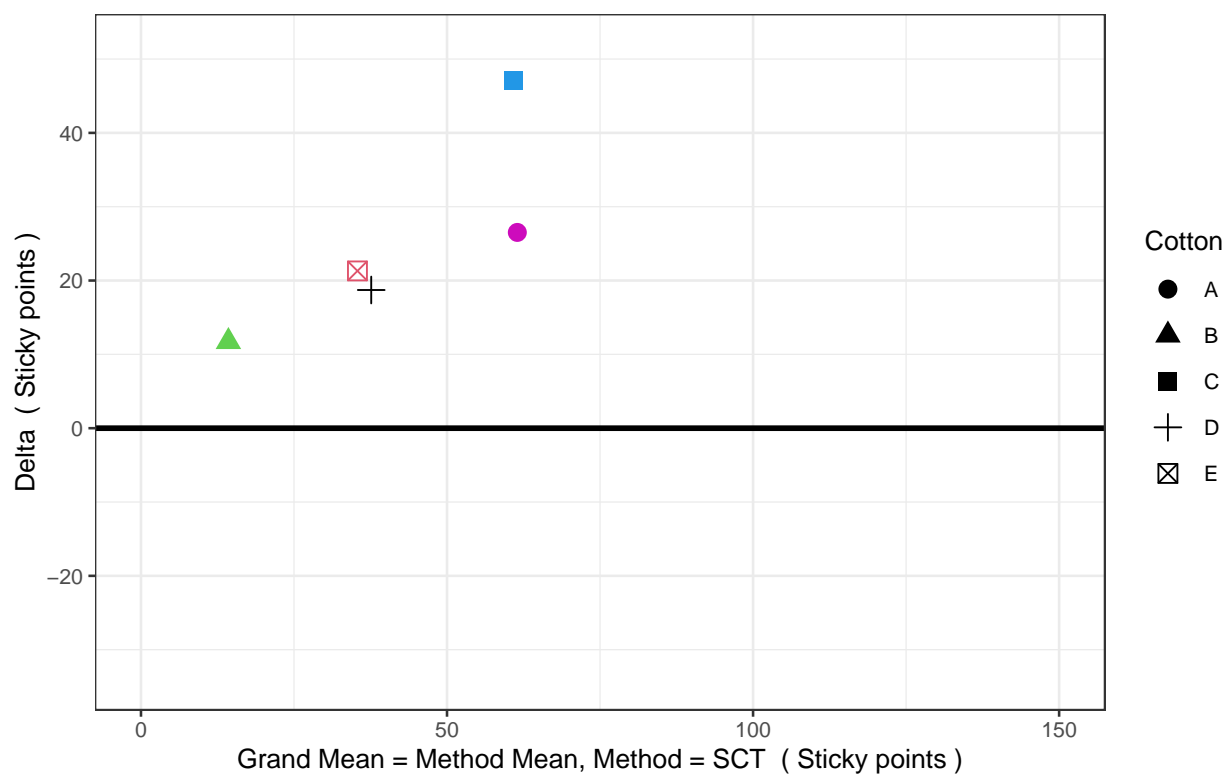
LabID = 125 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



LabID = 145 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



LabID = 160 Method = SCT (Sticky points)
Delta = Lab Mean – Method Mean



CommonScale ⁷

Principle

In ITMF-ICCTM meeting organized in March 2018 in Bremen, it was envisaged to compare results from various stickiness methods to check how close are the gained results. A proposal using a pro-rata approach was made as one way to achieve this comparison. The following table gives the numeric values to which each and all results from this round-test were calculated with the following formula: $CommonScale = \frac{LabID \text{ reading} * 100}{MaxEver \text{ for this method}}$, with MaxEver being the maximum value that any given method could read for the most sticky cotton ever. This will continue as long as necessary.

During this ITMF-ICCTM meeting in March 2018, it was also mentioned that MaxEver may not be the best way to base the provided calculations for COMmonScale. We then expect Participating Laboratories to propose an other calculation method(s), which then would be added to this report in the future.

Method	MaxEver	Unit
Caramelization	7.0	Color degree
Contest-S	750.0	C/F Grade
H2SD	70.0	Sticky points
KOTITI	9.0	KOTITI Grade
Minicard	3.0	ITMF grade
MinicardC	7.0	Cirad grade
Qualitative method	4.0	Grade
Quantitative method	1.2	Percent
SCT	150.0	Sticky points

For instance,

- a reading of 2 at the minicard, with a MaxEver set at 3, will convert into a CommonScale reading of:
$$67 = \frac{2 * 100}{3}.$$
- a reading of 63 at the SCT, with a MaxEver set at 150, will convert into a CommonScale reading of:
$$42 = \frac{63 * 100}{150}.$$
- *etc.*

⁷Footnote

* In the following charts, ML stands for the code Method x LabID.

* In the following charts, LM stands for the code LabID x Method.

* NA excluded

* Black dashed line = Method MeanInterLab per cotton and per Method.

* Red + = Laboratory mean for the given method and for the given cotton.

* Black x = Laboratory or CommonScale reading or individual reading for the given method and for the given cotton.

Limitations of the CommonScale approach

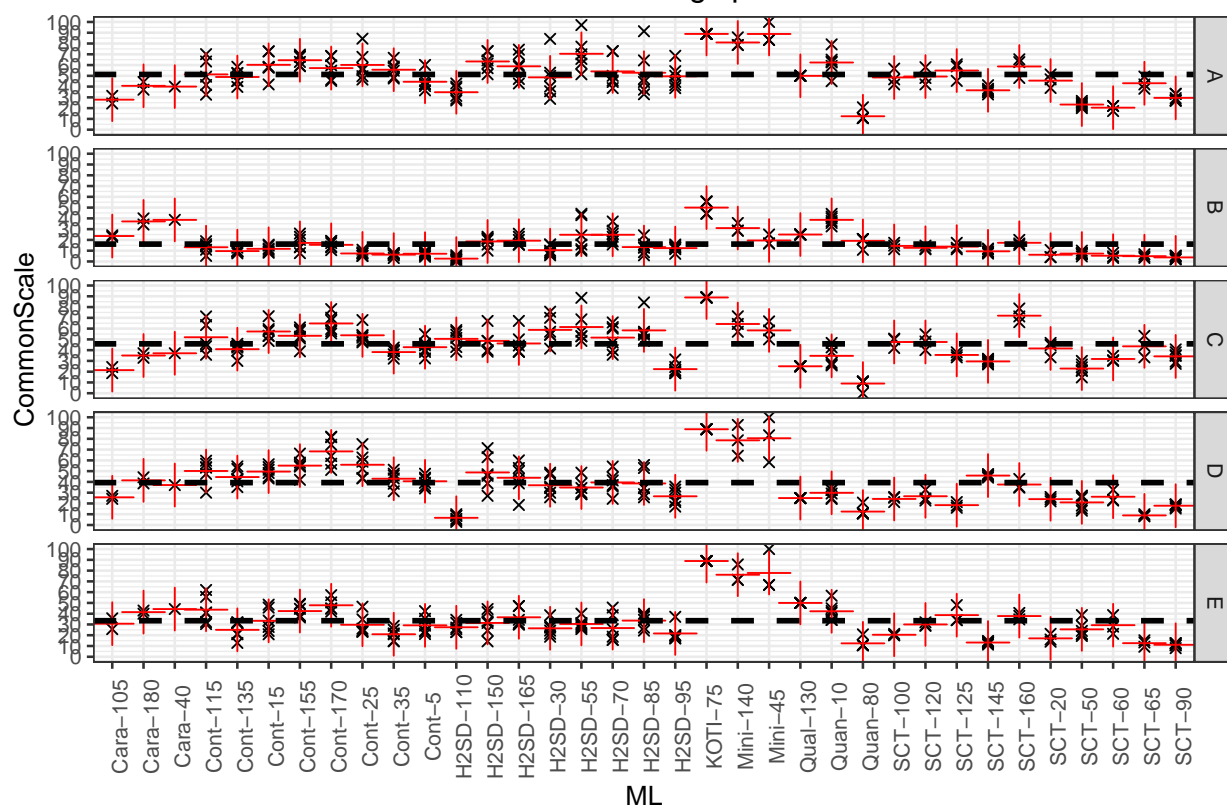
This approach has potential limitations:

- The resolution of CommonScale results is not equivalent for methods having a discrete scale, especially when the number of levels is low (for instance, levels for minicard stickiness grading is limited to 4 [0, 1, 2 and 3]) letting the corresponding CommonScale only limited to 0, 33, 67 and 100 results. In the same time, other methods having counts expressed in sticky points on extended scales for instance have lot more possibilities, as well as method being able to measure according to a continuous scale.
- **It only is safe to compare methods that are measuring the same single phenomenon, stickiness, or phenomenon that are related to stickiness.** At this point in time, it is not given that all present methods are measuring ‘stickiness’ or criterion that are related to stickiness.
- This CommonScale approach provides results that still are cotton dependent.
- This CommonScale approach may squeeze the scale for lower or highly stickiness contaminated cottons.
- This CommonScale approach may therefore have incidence on precision and accuracy of gained results.

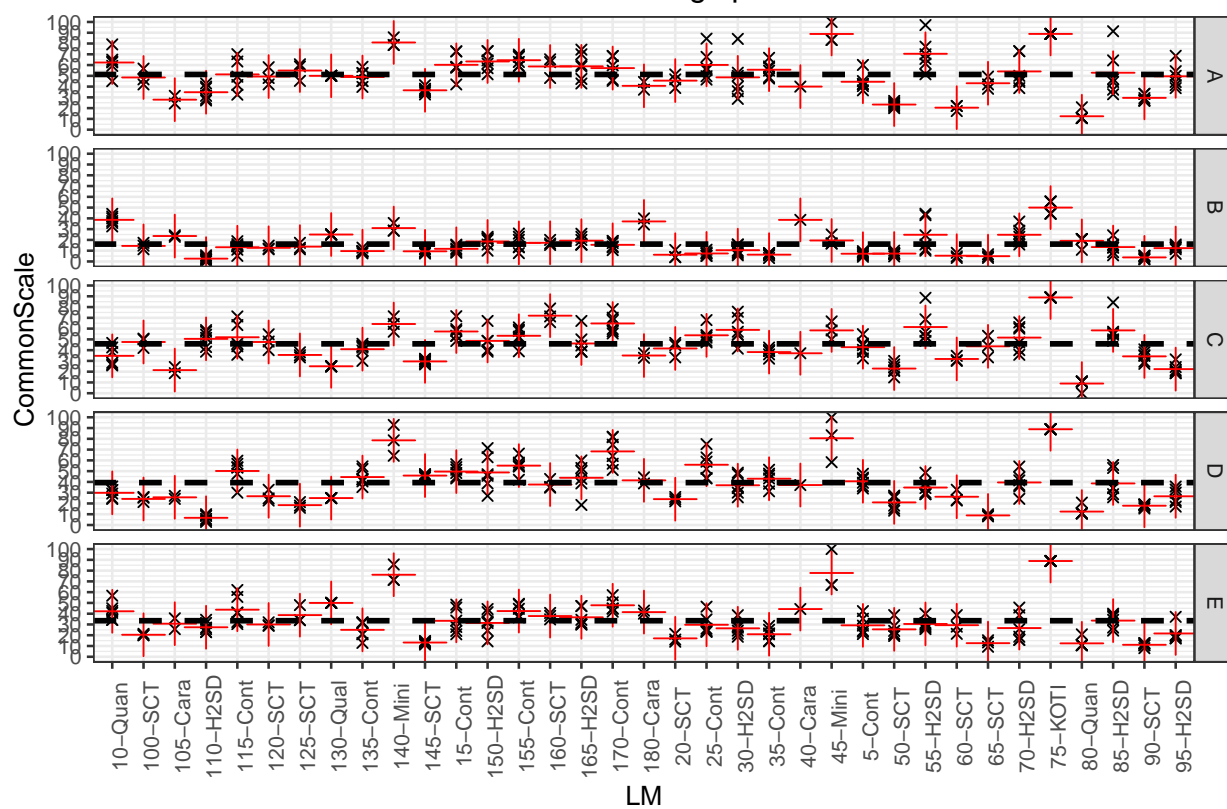
As a conclusion, as said earlier, CommonScale will be experimented at least for some round-tests in order to see if it could help Manufacturers and Users ***to get closer and closer results for each method for the same cottons over time.*** On the long run, the ability of each method to characterize stickiness ***in its strict sense*** will have to be evaluated to go further in the harmonization process; this could be by restricting some method(s) to be present in this round-test if they do not predict well enough stickiness troubles: a procedure has to be developed accordingly.

CommonScale charts

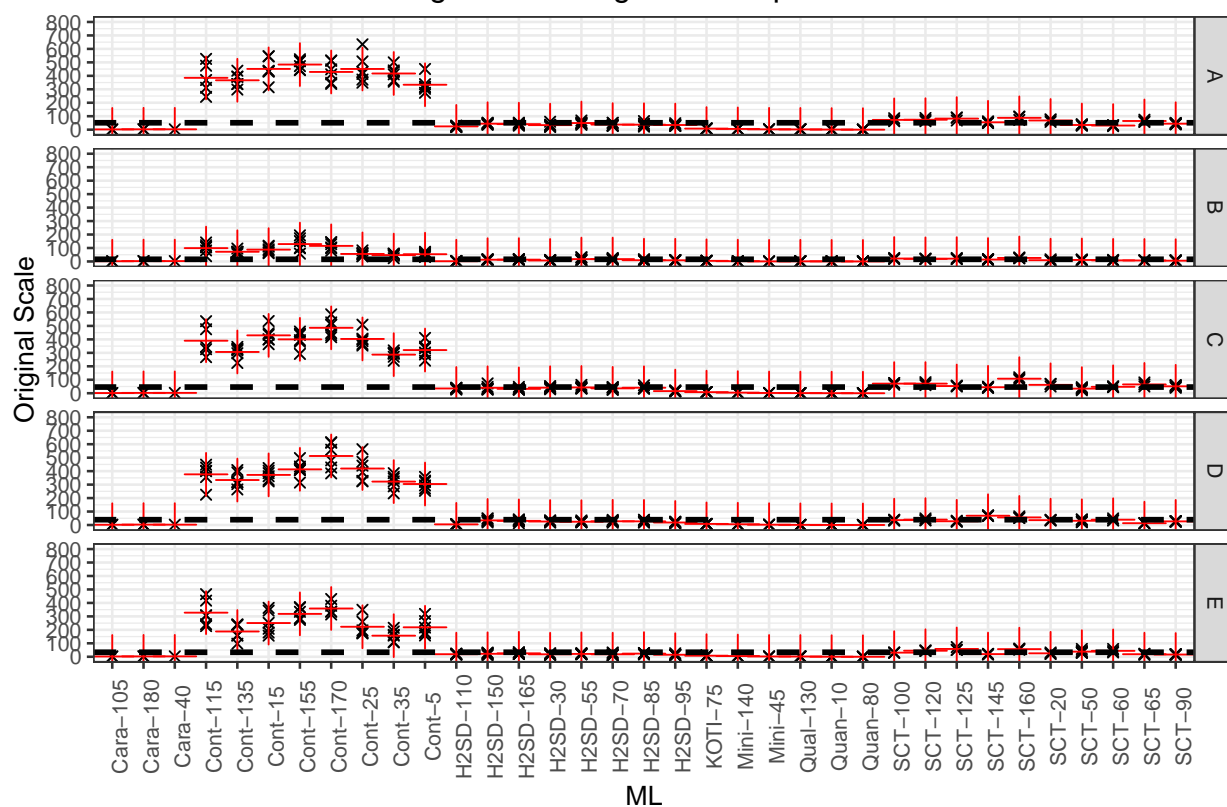
Individual CommonScale readings per Method and LabID



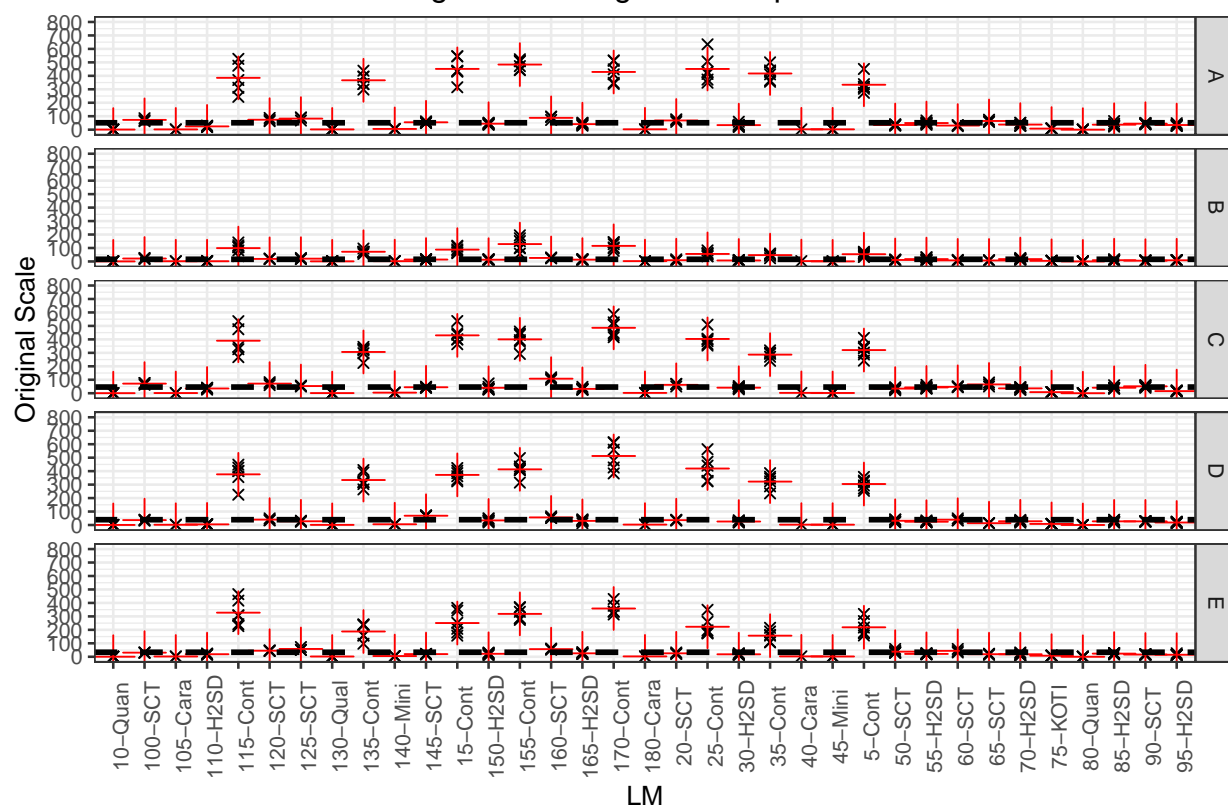
Individual CommonScale readings per LabID and Method



Individual readings in their original scale per Method and LabID



Individual readings in their original scale per LabID and Method



Overall statistics per Cotton and Method ⁸

The following tables provide information about observed variations between results of various instruments within each method, for each of all used methods and for each and all cottons used in this round-test.

- Comparing the CVs between the lines of these tables - meaning comparing methods for each cotton - is not helpfull at all, as units used are very different between methods (so different that it has been necessary to create the CommonScale approach just displayed above to get a way of comparing results).
- However seing the evolution of these CV values over time, Method by Method, will inform about the degree of harmonization achieved for stickiness measurement. A decrease of the CV values between instruments for each Method - which is expected over time - will give indications about the degree of care taken by Laboratories and Manufacturers to harmonize results over time for their respective methods.

⁸Footnote

* NA or NaN excluded from the original raw data * NA appears in the following tables when less that two laboratories provided data for the given cotton and method

* Mean and Standard Deviation expressed in Unit, CV expressed in %

Mean, standard deviation and CV between instruments by method, Cotton A

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.5	0.5	20.0	Color degree
Contest-S	414.8	49.8	12.0	C/F Grade
H2SD	37.8	7.5	19.8	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	2.7	NA	NA	ITMF grade
MinicardC	5.7	NA	NA	Cirad grade
Qualitative method	2.0	NA	NA	Grade
Quantitative method	0.4	0.4	94.2	Percent
SCT	61.5	19.6	31.9	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton B

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.3	0.6	25.0	Color degree
Contest-S	82.6	30.4	36.8	C/F Grade
H2SD	11.0	5.3	47.9	Sticky points
KOTITI	4.5	NA	NA	KOTITI Grade
Minicard	0.6	NA	NA	ITMF grade
MinicardC	2.2	NA	NA	Cirad grade
Qualitative method	1.0	NA	NA	Grade
Quantitative method	0.3	0.2	47.6	Percent
SCT	14.3	7.1	49.6	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton C

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.2	0.6	27.3	Color degree
Contest-S	377.8	68.0	18.0	C/F Grade
H2SD	35.6	8.8	24.8	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	1.8	NA	NA	ITMF grade
MinicardC	4.5	NA	NA	Cirad grade
Qualitative method	1.0	NA	NA	Grade
Quantitative method	0.3	0.2	83.1	Percent
SCT	60.9	20.4	33.6	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton D

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.4	0.6	23.4	Color degree
Contest-S	381.8	67.0	17.6	C/F Grade
H2SD	24.1	9.1	37.6	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	2.4	NA	NA	ITMF grade
MinicardC	5.5	NA	NA	Cirad grade
Qualitative method	1.0	NA	NA	Grade
Quantitative method	0.3	0.1	58.0	Percent
SCT	37.6	15.6	41.4	Sticky points

Mean, standard deviation and CV between instruments by method, Cotton E

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Caramelization	2.7	0.5	18.4	Color degree
Contest-S	255.2	72.3	28.3	C/F Grade
H2SD	20.5	3.3	16.1	Sticky points
KOTITI	8.0	NA	NA	KOTITI Grade
Minicard	2.3	NA	NA	ITMF grade
MinicardC	5.3	NA	NA	Cirad grade
Qualitative method	2.0	NA	NA	Grade
Quantitative method	0.3	0.3	76.8	Percent
SCT	35.4	15.3	43.4	Sticky points

Frequently asked questions (Q) and answers (A) ⁹

Q: Correlation matrix are sometimes difficult to read due to formatting; is there any improvement possible?

A: We search for a solution, probably for next RT. Sorry for the inconvenience in the meantime.

Q: For SCT, do we have to report the number of sticky points adhering to the top and the one adhering to the bottom aluminum foils in each cell of the provided Excel sheet, or do we have to report their sum?

A: _ For SCT, please only report the sum of the counts observed on the top and bottom foils _ in each cell of the Excel sheet; thanks.

Q: Why are the cells of the Excel form locked?

A: The cells are locked to avoid modifications in the template to enable our importing system 'to know' where to get each piece of information for placing and pasting it into a devoted cell in the data base system. This saves time and secures the data in its original state (avoiding typing mistakes). So please _ make sure to use the proper Excel template: use the latest form that was sent together with the announcement of samples dispatch for sending back you results. _

Q: What 'GB/T13785-1992' stands for?

A: GB/T13785-1992 stands for a Chinese standards called 'Test method for degree of sugar contains in cotton fibers – Colorimetry'.

Q: What 'H2SD' stands for?

A: H2SD stands for High Speed Stickiness Detector.

Q: What 'HSI-NIR' stands for?

A: HSI-NIR stands for Hyper Spectral Imaging based on Near Infra-red spectra.

Q: What 'SCT' stands for?

A: SCT stands for Sticky Cotton Thermodetector.

Q: What 'TDM-A' stands for?

A: TDM-A stands for Thermo Detection Method, and A stands for a specific scale for designing the stickiness level.

To be complemented on demand.

⁹Footnote

* Based on all round-tests carried out already.

Software components to realize this report ¹⁰

Software code version: June 30, 2021 by Jean-Paul Gurlot

R version 4.0.2 (2020-06-22) Platform: x86_64-w64-mingw32/x64 (64-bit) Running under: Windows 10 x64 (build 19042)

Matrix products: default

locale: [1] LC_COLLATE=French_France.1252 LC_CTYPE=French_France.1252 LC_MONETARY=French_France.1252 LC_NUMERIC=C

[5] LC_TIME=French_France.1252

attached base packages: [1] grid stats graphics grDevices utils datasets methods base

other attached packages: [1] rmarkdown_2.3 markdown_1.1 ggplot2_3.3.2 reshape2_1.4.4 xlsx_0.6.3
xlsxjars_0.6.1 rJava_0.9-13 knitr_1.29 readxl_1.3.1

loaded via a namespace (and not attached): [1] Rcpp_1.0.5 highr_0.8 cellranger_1.1.0 compiler_4.0.2
pillar_1.4.6 plyr_1.8.6 tools_4.0.2 digest_0.6.25

[9] evaluate_0.14 lifecycle_0.2.0 tibble_3.0.3 gtable_0.3.0 pkgconfig_2.0.3 rlang_0.4.7 cli_2.0.2 rstudioapi_0.11 [17] yaml_2.2.1 xfun_0.16 withr_2.2.0 stringr_1.4.0 vctrs_0.3.2 glue_1.4.1 R6_2.4.1 re-match_1.0.1

[25] fansi_0.4.1 farver_2.0.3 magrittr_1.5 scales_1.1.1 htmltools_0.5.0 ellipsis_0.3.1 assertthat_0.2.1
colorspace_1.4-1 [33] labeling_0.3 tinytex_0.25.1 stringi_1.4.6 munsell_0.5.0 crayon_1.3.4

¹⁰Footnote

* List of all R components for processing the data

[1] “ICCTM-ITMF-RTStick 2021-2_Long_2021-12-14_Raw”

General conclusions about the results of this round-test

At this point, some general conclusions can be drawn from the results of this round-test:

- Eight methods (one with two scales; in past RTS, up to 11 methods were participating) for measuring stickiness were used. It seems that we recover from the current pandemic as the number of participants is increasing back again. It could also be that our conclusions in Bremen Conferences already reached the participants (see below), and that they are trying to make according decision for their future testing instrumentation and procedures.
- Maybe following the March 2021 meeting in Bremen, three methods are counting increasing participation: Contest-S (8), H2SD (8) and SCT (10). Maybe also it is because participants had a look on past reports and Bremen ITMF-ICCTM presentations, we can see that some methods have also disappeared over time.
- Thirty six instruments participated to this test. On our side, we were not able to deliver samples to some laboratories due to restrictions by carriers. This report is the only official one for ever.
- Levels of reading as well as units to express stickiness remain quite different, confirming that maybe all methods are not exactly measuring the same property that all methods however name 'stickiness' by all methods. This could be a problem for the comparability of the measurements and the application of the results in processing;
- Variations in results are still quite high between laboratories using the same method, inducing somewhat low levels of reproducibility in the measurements;
- This variation seems not evolving since RT2017-1; please see last comment below;
- If one would compare methods, it would require calculating a representative result for each of the used methods; however taking care of the observed large variability levels in the results - both within laboratory and between laboratories - a mean result or a median result per method would not be meaningful at this stage. When these levels of variability will decrease, such a comparison will be published for each round-test occurrence.
- As discussed in Bremen (March 2018), since RT 2018-1, a new chapter appeared in the full report about the CommonScale approach as a first attempt of harmonization within and between methods (the later, at the condition that all methods do measure stickiness which will have to be proven according to a procedure to be developed).
- As discussed in Bremen (March 2021), harmonization steps will concentrate on thermo-mechanic methods and keeping the minicard as ITMF-ICCTM reference. More information will be disseminated on the harmonization steps in the future.
- To see the presentation that was made about this round-test in Bremen in March 2021, based on all acquired results since 2017, please visit: https://baumwollboerse.de/wp-content/uploads/2021/06/CCB_2021-T5-Gourlot-Drieling.pdf and/or <https://www.itmf.org/images/dl/reports/icctm-reports/ICCTM-Report-2021.pdf>
- As we assume that by showing their relative position of each laboratory on comparison with others will induce corrective actions to favor more harmonized results along time, we will run other occurrences of

this stickiness round-test in the coming times.

We recommend laboratories to observe their position and deduce the potential corrective actions that will lead to more grouped results in the coming round-test occurrences.

We stay available to all laboratories participating to this RT as long as possible during the pandemic. However, preparing and dispatching samples has a cost and we urge laboratories receiving samples to submit their results in due time.

In the same time, if you would have several kilograms of homogeneous material having a typical sticky behavior, and that you would like this cotton to participate in one or several future round-test occurrence(s), please contact Jean-Paul GOURLOT. Every thing will remain confidential at any time.

Finally, next round-test samples will be sent in a close future. Messages will be sent to the mailbox of participating laboratories contacts. If you know other laboratories who wish to participate, please ask them to contact us... Thanks for the cotton community.

We stay at disposal for any additional discussion; we do hope to see you again during the coming next RT later within the coming months.

Thank you again for your participation and support.