Round Test on

stickiness characterization methods

Test: 2025-1

FINAL LONG REPORT

Faserinstitut Bremen and Bremen Cotton Exchange (BBB)

with external and CIRAD technical support

based on the International Cotton Committee on Testing Method of the International Textile Manufacturers Federation (ITMF-ICCTM), Stickiness Task Force

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

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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.

Drieling Axel, Gourlot Jean-Paul, Giner Michel, Wirth Jens, Kuntze Vanessa. 2025. Round Test 2025-1 on stickiness characterization methods - Final report. Montpellier : CIRAD-ITMF, 112 p.

Preparation of cottons and samples

A range of four 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 February 2025.

After experimenting some problems in sample deliveries, all laboratories finally sent their results back by May 4, 2025. 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 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 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
  - Heavy : 4 (new since in RT2025-1).

- For quantitative: one measurement = one cell. No transformation of the data.
- For SCT: one measurement = one record = sum of reading of top foil + reading of bottom foil.

All individual results per Method and LabID for each cotton [1]

[1] Footnote

* Results sorted by Method and then by LabID.
* NA or NaN : no result provided.

Table for Cotton A

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Contest-S	25	65.0	44.0	50.0	40.0	34.0	70.0	Contest Grad
Contest-S	35	84.0	25.0	50.0	7.0	49.0	40.0	Contest Grad
Contest-S	50	79.0	38.0	62.0	70.0	60.0	78.0	Contest Grad
Contest-S	60	95.0	105.0	191.0	76.0	109.0	95.0	Contest Grad
Contest-S	65	138.0	44.0	28.0	20.0	24.0	117.0	Contest Grad
Contest-S	85	92.0	196.0	130.0	58.0	72.0	120.0	Contest Grad
Contest-S	90	164.0	66.0	78.0	44.0	77.0	52.0	Contest Grad
Contest-S	105	59.0	87.0	71.0	NA	NA	NA	Contest Grad
Contest-S	125	169.0	144.0	426.0	96.0	72.0	165.0	Contest Grad
Contest-S	130	114.0	57.0	109.0	69.0	71.0	84.0	Contest Grad
Contest-S	150	188.0	110.0	93.0	124.0	105.0	83.0	Contest Grad
Contest-S	155	71.0	109.0	118.0	38.0	56.0	106.0	Contest Grad
GB/T13785-	45	1.0	1.0	2.0	1.0	NA	NA	Color degree
H2SD	95	6.0	5.0	7.0	4.0	3.0	6.0	Sticky point
H2SD	135	10.0	9.0	11.0	9.0	9.0	8.0	Sticky point
H2SD	160	11.0	16.0	13.0	22.0	9.0	NA	Sticky point
H2SD	165	7.0	13.0	10.0	5.0	12.0	NA	Sticky point
H2SD	170	15.0	13.0	18.0	15.0	28.0	NA	Sticky point
H2SD	175	15.0	20.0	16.0	15.0	9.0	NA	Sticky point
KOTITI	80	2.0	2.0	2.0	5.0	2.0	2.0	Kotiti grade
Qualitativ	55	1.0	1.0	2.0	NA	NA	NA	Grade
Quantitati	10	0.2	0.2	0.2	0.2	0.3	0.3	Percent
SCT	5	11.0	13.0	10.0	9.0	12.0	10.0	Sticky point
SCT	15	28.0	24.0	27.0	NA	NA	NA	Sticky point
SCT	20	10.0	8.0	18.0	NA	NA	NA	Sticky point
SCT	30	27.0	21.0	19.0	NA	NA	NA	Sticky point
SCT	40	18.0	23.0	19.0	NA	NA	NA	Sticky point
SCT	70	22.0	14.0	15.0	18.0	NA	NA	Sticky point
SCT	75	20.0	35.0	21.0	28.0	NA	NA	Sticky point
SCT	100	23.0	29.0	21.0	NA	NA	NA	Sticky point
SCT	110	15.0	18.0	17.0	15.0	NA	NA	Sticky point
SCT	115	26.0	27.0	32.0	NA	NA	NA	Sticky point
SCT	120	35.0	25.0	31.0	26.0	NA	NA	Sticky point
SCT	140	20.0	24.0	19.0	NA	NA	NA	Sticky point
SCT	145	7.0	6.0	13.0	12.0	14.0	10.0	Sticky point

Table for Cotton B

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Contest-S	25	157.0	226.0	140.0	191.0	127.0	218.0	Contest Grad
Contest-S	35	115.0	150.0	61.0	106.0	102.0	136.0	Contest Grad
Contest-S	50	228.0	312.0	201.0	209.0	301.0	249.0	Contest Grad
Contest-S	60	342.0	376.0	302.0	278.0	251.0	300.0	Contest Grad
Contest-S	65	83.0	232.0	152.0	117.0	114.0	87.0	Contest Grad
Contest-S	85	390.0	333.0	399.0	326.0	343.0	334.0	Contest Grad
Contest-S	90	255.0	273.0	249.0	237.0	205.0	260.0	Contest Grad
Contest-S	105	169.0	215.0	198.0	NA	NA	NA	Contest Grad
Contest-S	125	201.0	282.0	345.0	323.0	319.0	369.0	Contest Grad
Contest-S	130	373.0	379.0	380.0	317.0	333.0	330.0	Contest Grad
Contest-S	150	278.0	324.0	240.0	271.0	286.0	277.0	Contest Grad
Contest-S	155	227.0	180.0	249.0	182.0	302.0	191.0	Contest Grad
GB/T13785-	45	2.0	1.0	2.0	3.0	NA	NA	Color degree
H2SD	95	38.0	35.0	30.0	40.0	27.0	34.0	Sticky point
H2SD	135	16.0	17.0	16.0	21.0	14.0	18.0	Sticky point
H2SD	160	40.0	27.0	29.0	26.0	28.0	45.0	Sticky point
H2SD	165	60.0	36.0	18.0	42.0	39.0	35.0	Sticky point
H2SD	170	20.0	23.0	30.0	16.0	21.0	26.0	Sticky point
H2SD	175	23.0	19.0	24.0	21.0	36.0	28.0	Sticky point
KOTITI	80	9.0	9.0	6.0	7.0	9.0	9.0	Kotiti grade
Qualitativ	55	1.0	1.0	2.0	NA	NA	NA	Grade
Quantitati	10	0.4	0.4	0.3	0.4	0.4	0.3	Percent
SCT	5	19.0	25.0	20.0	21.0	24.0	26.0	Sticky point
SCT	15	31.0	31.0	31.0	NA	NA	NA	Sticky point
SCT	20	23.0	34.0	25.0	NA	NA	NA	Sticky point
SCT	30	19.0	25.0	31.0	NA	NA	NA	Sticky point
SCT	40	53.0	35.0	36.0	27.0	NA	NA	Sticky point
SCT	70	23.0	44.0	29.0	41.0	NA	NA	Sticky point
SCT	75	28.0	37.0	34.0	36.0	NA	NA	Sticky point
SCT	100	32.0	32.0	33.0	NA	NA	NA	Sticky point
SCT	110	22.0	26.0	28.0	NA	NA	NA	Sticky point
SCT	115	29.0	23.0	46.0	28.0	NA	NA	Sticky point
SCT	120	43.0	33.0	34.0	NA	NA	NA	Sticky point
SCT	140	39.0	26.0	42.0	59.0	NA	NA	Sticky point
SCT	145	47.0	43.0	49.0	39.0	40.0	45.0	Sticky point

Table for Cotton C

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Contest-S	25	206.0	123.0	249.0	211.0	243.0	315.0	Contest Grad
Contest-S	35	107.0	73.0	106.0	82.0	94.0	127.0	Contest Grad
Contest-S	50	375.0	264.0	293.0	267.0	285.0	261.0	Contest Grad
Contest-S	60	302.0	285.0	423.0	339.0	390.0	278.0	Contest Grad
Contest-S	65	45.0	120.0	181.0	61.0	57.0	91.0	Contest Grad
Contest-S	85	282.0	379.0	290.0	267.0	269.0	372.0	Contest Grad
Contest-S	90	242.0	255.0	328.0	229.0	232.0	341.0	Contest Grad
Contest-S	105	207.0	328.0	287.0	NA	NA	NA	Contest Grad
Contest-S	125	417.0	380.0	221.0	301.0	274.0	314.0	Contest Grad
Contest-S	130	296.0	399.0	336.0	364.0	282.0	421.0	Contest Grad
Contest-S	150	305.0	203.0	270.0	293.0	228.0	241.0	Contest Grad
Contest-S	155	226.0	386.0	192.0	348.0	304.0	215.0	Contest Grad
GB/T13785-	45	2.0	2.0	3.0	2.0	NA	NA	Color degree
H2SD	95	40.0	25.0	24.0	47.0	18.0	23.0	Sticky point
H2SD	135	29.0	29.0	23.0	25.0	23.0	25.0	Sticky point
H2SD	160	35.0	39.0	46.0	31.0	18.0	33.0	Sticky point
H2SD	165	24.0	19.0	18.0	31.0	23.0	23.0	Sticky point
H2SD	170	21.0	23.0	24.0	29.0	18.0	23.0	Sticky point
H2SD	175	21.0	10.0	15.0	21.0	10.0	15.0	Sticky point
KOTITI	80	9.0	9.0	9.0	9.0	9.0	9.0	Kotiti grade
Qualitativ	55	1.0	2.0	2.0	NA	NA	NA	Grade
Quantitati	10	0.3	0.3	0.3	0.3	0.3	0.3	Percent
SCT	5	36.0	32.0	31.0	34.0	37.0	35.0	Sticky point
SCT	15	51.0	45.0	61.0	59.0	NA	NA	Sticky point
SCT	20	59.0	31.0	22.0	NA	NA	NA	Sticky point
SCT	30	53.0	70.0	52.0	NA	NA	NA	Sticky point
SCT	40	38.0	37.0	44.0	NA	NA	NA	Sticky point
SCT	70	43.0	53.0	62.0	34.0	NA	NA	Sticky point
SCT	75	51.0	51.0	80.0	NA	NA	NA	Sticky point
SCT	100	46.0	49.0	48.0	NA	NA	NA	Sticky point
SCT	110	48.0	54.0	65.0	43.0	NA	NA	Sticky point
SCT	115	51.0	70.0	82.0	NA	NA	NA	Sticky point
SCT	120	67.0	55.0	51.0	NA	NA	NA	Sticky point
SCT	140	64.0	51.0	39.0	64.0	NA	NA	Sticky point
SCT	145	68.0	64.0	59.0	65.0	59.0	69.0	Sticky point

Table for Cotton D

Meth	LabID	R1	R2	R3	R4	R5	R6	Un
Contest-S	25	579.0	443.0	477.0	496.0	498.0	385.0	Contest Grad
Contest-S	35	136.0	299.0	281.0	150.0	152.0	331.0	Contest Grad
Contest-S	50	545.0	498.0	544.0	462.0	443.0	491.0	Contest Grad
Contest-S	60	742.0	556.0	597.0	636.0	673.0	654.0	Contest Grad
Contest-S	65	504.0	350.0	495.0	393.0	123.0	112.0	Contest Grad
Contest-S	85	571.0	703.0	424.0	637.0	406.0	493.0	Contest Grad
Contest-S	90	388.0	596.0	516.0	594.0	698.0	512.0	Contest Grad
Contest-S	105	522.0	489.0	509.0	NA	NA	NA	Contest Grad
Contest-S	125	620.0	544.0	590.0	623.0	649.0	591.0	Contest Grad
Contest-S	130	615.0	566.0	523.0	651.0	482.0	571.0	Contest Grad
Contest-S	150	631.0	589.0	582.0	587.0	515.0	517.0	Contest Grad
Contest-S	155	654.0	529.0	475.0	554.0	549.0	539.0	Contest Grad
GB/T13785-	45	3.0	3.0	2.0	3.0	NA	NA	Color degree
H2SD	95	63.0	53.0	36.0	54.0	37.0	47.0	Sticky point
H2SD	135	34.0	35.0	37.0	35.0	36.0	34.0	Sticky point
H2SD	160	52.0	39.0	47.0	47.0	48.0	47.0	Sticky point
H2SD	165	25.0	24.0	39.0	27.0	35.0	50.0	Sticky point
H2SD	170	43.0	44.0	38.0	35.0	23.0	37.0	Sticky point
H2SD	175	50.0	40.0	36.0	54.0	43.0	45.0	Sticky point
KOTITI	80	8.0	8.0	8.0	8.0	8.0	8.0	Kotiti grade
Qualitativ	55	4.0	4.0	4.0	NA	NA	NA	Grade
Quantitati	10	0.6	0.6	0.9	0.7	0.8	0.8	Percent
SCT	5	54.0	52.0	58.0	61.0	63.0	57.0	Sticky point
SCT	15	80.0	78.0	51.0	NA	NA	NA	Sticky point
SCT	20	68.0	97.0	89.0	NA	NA	NA	Sticky point
SCT	30	76.0	79.0	57.0	NA	NA	NA	Sticky point
SCT	40	94.0	70.0	80.0	NA	NA	NA	Sticky point
SCT	70	96.0	74.0	58.0	NA	NA	NA	Sticky point
SCT	75	72.0	68.0	66.0	NA	NA	NA	Sticky point
SCT	100	82.0	108.0	69.0	NA	NA	NA	Sticky point
SCT	110	104.0	113.0	118.0	NA	NA	NA	Sticky point
SCT	115	91.0	103.0	77.0	NA	NA	NA	Sticky point
SCT	120	108.0	80.0	111.0	NA	NA	NA	Sticky point
SCT	140	66.0	96.0	77.0	NA	NA	NA	Sticky point
SCT	145	167.0	187.0	152.0	132.0	147.0	129.0	Sticky point

Statistics per Method, LabID for each cottons [2]

[2]Footnote

* 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
Contest-S	25	50.5	Contest Grad	203.1	28.2	88.2	-37.7
Contest-S	35	42.5	Contest Grad	678.7	61.3	88.2	-45.7
Contest-S	50	64.5	Contest Grad	230.3	23.5	88.2	-23.7
Contest-S	60	111.8	Contest Grad	1634.6	36.2	88.2	23.7
Contest-S	65	61.8	Contest Grad	2697.8	84.0	88.2	-26.3
Contest-S	85	111.3	Contest Grad	2471.5	44.7	88.2	23.2
Contest-S	90	80.2	Contest Grad	1869.0	53.9	88.2	-8.0
Contest-S	105	72.3	Contest Grad	197.3	19.4	88.2	-15.8
Contest-S	125	178.7	Contest Grad	16173.5	71.2	88.2	90.5
Contest-S	130	84.0	Contest Grad	529.6	27.4	88.2	-4.2
Contest-S	150	117.2	Contest Grad	1403.0	32.0	88.2	29.0
Contest-S	155	83.0	Contest Grad	1065.6	39.3	88.2	-5.2
GB/T13785-	45	1.2	Color degree	0.2	40.0	1.2	0.0
H2SD	95	5.2	Sticky point	2.2	28.5	11.8	-6.6
H2SD	135	9.3	Sticky point	1.1	11.1	11.8	-2.5
H2SD	160	14.2	Sticky point	25.7	35.7	11.8	2.4
H2SD	165	9.4	Sticky point	11.3	35.8	11.8	-2.4
H2SD	170	17.8	Sticky point	35.7	33.6	11.8	6.0
H2SD	175	15.0	Sticky point	15.5	26.2	11.8	3.2
KOTITI	80	2.5	Kotiti grade	1.5	49.0	2.5	0.0
Qualitativ	55	1.3	Grade	0.3	43.3	1.3	0.0
Quantitati	10	0.2	Percent	0.0	25.6	0.2	0.0
SCT	5	10.8	Sticky point	2.2	13.6	20.3	-9.5
SCT	15	26.3	Sticky point	4.3	7.9	20.3	6.0
SCT	20	12.0	Sticky point	28.0	44.1	20.3	-8.3
SCT	30	22.3	Sticky point	17.3	18.6	20.3	2.0
SCT	40	20.0	Sticky point	7.0	13.2	20.3	-0.3
SCT	70	17.2	Sticky point	12.9	20.8	20.3	-3.1
SCT	75	26.0	Sticky point	48.7	26.8	20.3	5.7
SCT	100	24.3	Sticky point	17.3	17.1	20.3	4.0
SCT	110	16.2	Sticky point	2.2	9.2	20.3	-4.1
SCT	115	28.3	Sticky point	10.3	11.3	20.3	8.0
SCT	120	29.2	Sticky point	21.6	15.9	20.3	8.9
SCT	140	21.0	Sticky point	7.0	12.6	20.3	0.7
SCT	145	10.3	Sticky point	10.7	31.6	20.3	-10.0

Table for Cotton B

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Contest-S	25	176.5	Contest Grad	1709.1	23.4	244.3	-67.8
Contest-S	35	111.7	Contest Grad	953.1	27.6	244.3	-132.6
Contest-S	50	250.0	Contest Grad	2202.4	18.8	244.3	5.7
Contest-S	60	308.2	Contest Grad	2005.8	14.5	244.3	63.9
Contest-S	65	130.8	Contest Grad	3073.4	42.4	244.3	-113.5
Contest-S	85	354.2	Contest Grad	1013.4	9.0	244.3	109.9
Contest-S	90	246.5	Contest Grad	555.1	9.6	244.3	2.2
Contest-S	105	194.0	Contest Grad	541.0	12.0	244.3	-50.3
Contest-S	125	306.5	Contest Grad	3509.5	19.3	244.3	62.2
Contest-S	130	352.0	Contest Grad	804.8	8.1	244.3	107.7
Contest-S	150	279.3	Contest Grad	732.7	9.7	244.3	35.0
Contest-S	155	221.8	Contest Grad	2295.8	21.6	244.3	-22.5
GB/T13785-	45	2.0	Color degree	0.7	40.8	2.0	0.0
H2SD	95	34.0	Sticky point	23.6	14.3	28.3	5.7
H2SD	135	17.0	Sticky point	5.6	13.9	28.3	-11.3
H2SD	160	32.5	Sticky point	63.5	24.5	28.3	4.2
H2SD	165	38.3	Sticky point	182.7	35.3	28.3	10.1
H2SD	170	22.7	Sticky point	23.9	21.6	28.3	-5.6
H2SD	175	25.2	Sticky point	37.4	24.3	28.3	-3.1
KOTITI	80	8.2	Kotiti grade	1.8	16.3	8.2	0.0
Qualitativ	55	1.3	Grade	0.3	43.3	1.3	0.0
Quantitati	10	0.4	Percent	0.0	7.2	0.4	0.0
SCT	5	22.5	Sticky point	8.3	12.8	32.5	-10.0
SCT	15	31.0	Sticky point	0.0	0.0	32.5	-1.5
SCT	20	27.3	Sticky point	34.3	21.4	32.5	-5.2
SCT	30	25.0	Sticky point	36.0	24.0	32.5	-7.5
SCT	40	37.8	Sticky point	119.6	29.0	32.5	5.2
SCT	70	34.2	Sticky point	98.2	28.9	32.5	1.7
SCT	75	33.8	Sticky point	16.2	11.9	32.5	1.2
SCT	100	32.3	Sticky point	0.3	1.8	32.5	-0.2
SCT	110	25.3	Sticky point	9.3	12.1	32.5	-7.2
SCT	115	31.5	Sticky point	100.3	31.8	32.5	-1.0
SCT	120	36.7	Sticky point	30.3	15.0	32.5	4.1
SCT	140	41.5	Sticky point	184.3	32.7	32.5	9.0
SCT	145	43.8	Sticky point	15.4	8.9	32.5	11.3

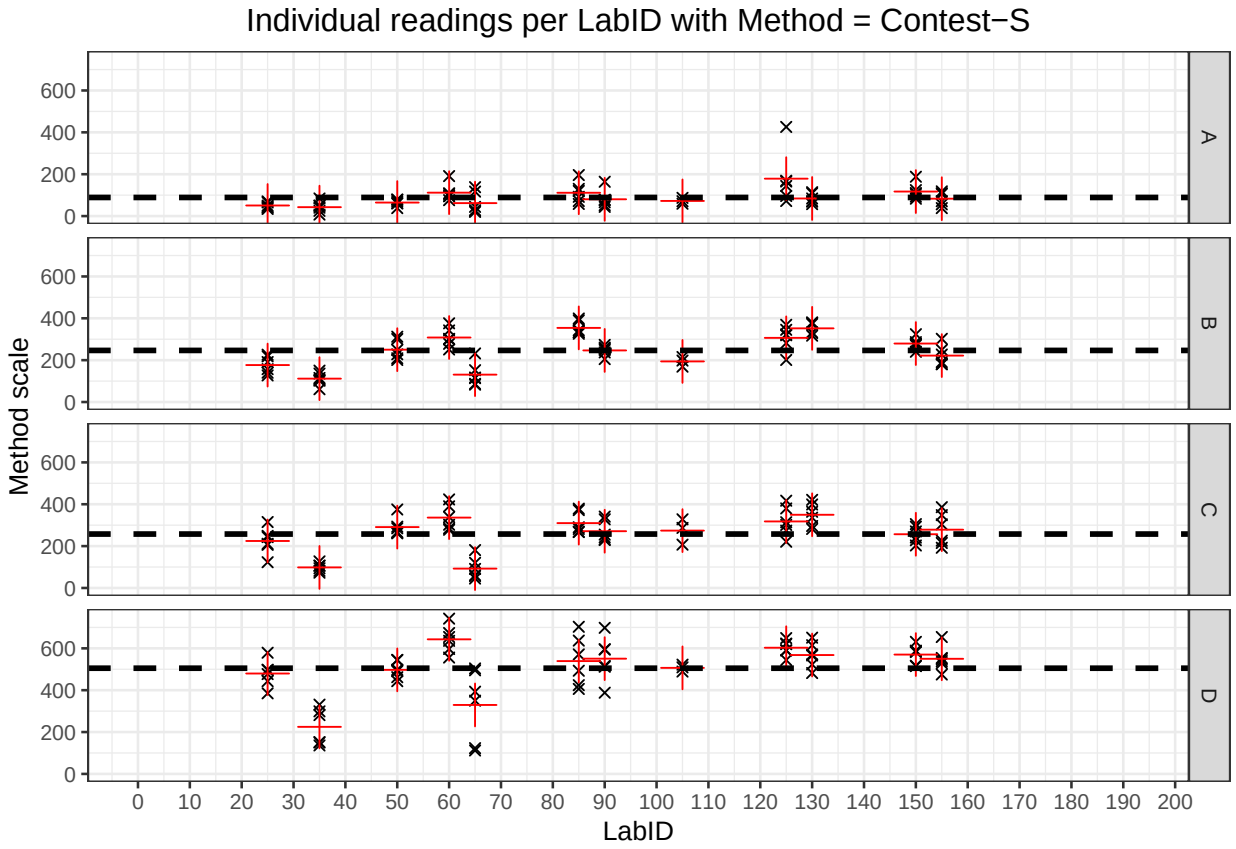
Table for Cotton C

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Contest-S	25	224.5	Contest Grad	3991.9	28.1	258.3	-33.8
Contest-S	35	98.2	Contest Grad	376.6	19.8	258.3	-160.2
Contest-S	50	290.8	Contest Grad	1860.2	14.8	258.3	32.5
Contest-S	60	336.2	Contest Grad	3523.0	17.7	258.3	77.8
Contest-S	65	92.5	Contest Grad	2619.9	55.3	258.3	-165.8
Contest-S	85	309.8	Contest Grad	2663.8	16.7	258.3	51.5
Contest-S	90	271.2	Contest Grad	2506.2	18.5	258.3	12.8
Contest-S	105	274.0	Contest Grad	3787.0	22.5	258.3	15.7
Contest-S	125	317.8	Contest Grad	5059.0	22.4	258.3	59.5
Contest-S	130	349.7	Contest Grad	3074.7	15.9	258.3	91.3
Contest-S	150	256.7	Contest Grad	1556.3	15.4	258.3	-1.7
Contest-S	155	278.5	Contest Grad	6261.5	28.4	258.3	20.2
GB/T13785-	45	2.2	Color degree	0.2	22.2	2.2	0.0
H2SD	95	29.5	Sticky point	128.3	38.4	25.0	4.5
H2SD	135	25.7	Sticky point	7.5	10.6	25.0	0.6
H2SD	160	33.7	Sticky point	87.1	27.7	25.0	8.6
H2SD	165	23.0	Sticky point	21.2	20.0	25.0	-2.0
H2SD	170	23.0	Sticky point	13.2	15.8	25.0	-2.0
H2SD	175	15.3	Sticky point	24.3	32.1	25.0	-9.7
KOTITI	80	9.0	Kotiti grade	0.0	0.0	9.0	0.0
Qualitativ	55	1.7	Grade	0.3	34.6	1.7	0.0
Quantitati	10	0.3	Percent	0.0	4.0	0.3	0.0
SCT	5	34.2	Sticky point	5.4	6.8	52.0	-17.8
SCT	15	54.0	Sticky point	54.7	13.7	52.0	2.0
SCT	20	37.3	Sticky point	372.3	51.7	52.0	-14.7
SCT	30	58.3	Sticky point	102.3	17.3	52.0	6.3
SCT	40	39.7	Sticky point	14.3	9.5	52.0	-12.3
SCT	70	48.0	Sticky point	147.3	25.3	52.0	-4.0
SCT	75	60.7	Sticky point	280.3	27.6	52.0	8.7
SCT	100	47.7	Sticky point	2.3	3.2	52.0	-4.3
SCT	110	52.5	Sticky point	89.7	18.0	52.0	0.5
SCT	115	67.7	Sticky point	244.3	23.1	52.0	15.7
SCT	120	57.7	Sticky point	69.3	14.4	52.0	5.7
SCT	140	54.5	Sticky point	144.3	22.0	52.0	2.5
SCT	145	64.0	Sticky point	18.4	6.7	52.0	12.0

Table for Cotton D

Meth	LabID	MeanIntraLab	Un	VarIntraLab	CVIntraLab	MeanInterLab	Delta
Contest-S	25	479.7	Contest Grad	4156.7	13.4	505.1	-25.5
Contest-S	35	224.8	Contest Grad	7744.6	39.1	505.1	-280.3
Contest-S	50	497.2	Contest Grad	1738.2	8.4	505.1	-8.0
Contest-S	60	643.0	Contest Grad	4111.2	10.0	505.1	137.9
Contest-S	65	329.5	Contest Grad	30448.3	53.0	505.1	-175.6
Contest-S	85	539.0	Contest Grad	14110.8	22.0	505.1	33.9
Contest-S	90	550.7	Contest Grad	10959.5	19.0	505.1	45.5
Contest-S	105	506.7	Contest Grad	276.3	3.3	505.1	1.5
Contest-S	125	602.8	Contest Grad	1319.8	6.0	505.1	97.7
Contest-S	130	568.0	Contest Grad	3706.4	10.7	505.1	62.9
Contest-S	150	570.2	Contest Grad	2069.8	8.0	505.1	65.0
Contest-S	155	550.0	Contest Grad	3404.0	10.6	505.1	44.9
GB/T13785-	45	2.8	Color degree	0.2	18.2	2.8	0.0
H2SD	95	48.3	Sticky point	110.3	21.7	40.8	7.5
H2SD	135	35.2	Sticky point	1.4	3.3	40.8	-5.6
H2SD	160	46.7	Sticky point	17.9	9.1	40.8	5.9
H2SD	165	33.3	Sticky point	101.9	30.3	40.8	-7.5
H2SD	170	36.7	Sticky point	57.1	20.6	40.8	-4.1
H2SD	175	44.7	Sticky point	43.1	14.7	40.8	3.9
KOTITI	80	8.0	Kotiti grade	0.0	0.0	8.0	0.0
Qualitativ	55	4.0	Grade	0.0	0.0	4.0	0.0
Quantitati	10	0.7	Percent	0.0	16.6	0.7	0.0
SCT	5	57.5	Sticky point	17.1	7.2	86.8	-29.3
SCT	15	69.7	Sticky point	262.3	23.2	86.8	-17.1
SCT	20	84.7	Sticky point	224.3	17.7	86.8	-2.1
SCT	30	70.7	Sticky point	142.3	16.9	86.8	-16.1
SCT	40	81.3	Sticky point	145.3	14.8	86.8	-5.5
SCT	70	76.0	Sticky point	364.0	25.1	86.8	-10.8
SCT	75	68.7	Sticky point	9.3	4.4	86.8	-18.1
SCT	100	86.3	Sticky point	394.3	23.0	86.8	-0.5
SCT	110	111.7	Sticky point	50.3	6.4	86.8	24.9
SCT	115	90.3	Sticky point	169.3	14.4	86.8	3.5
SCT	120	99.7	Sticky point	292.3	17.2	86.8	12.9
SCT	140	79.7	Sticky point	230.3	19.1	86.8	-7.1
SCT	145	152.3	Sticky point	480.7	14.4	86.8	65.5

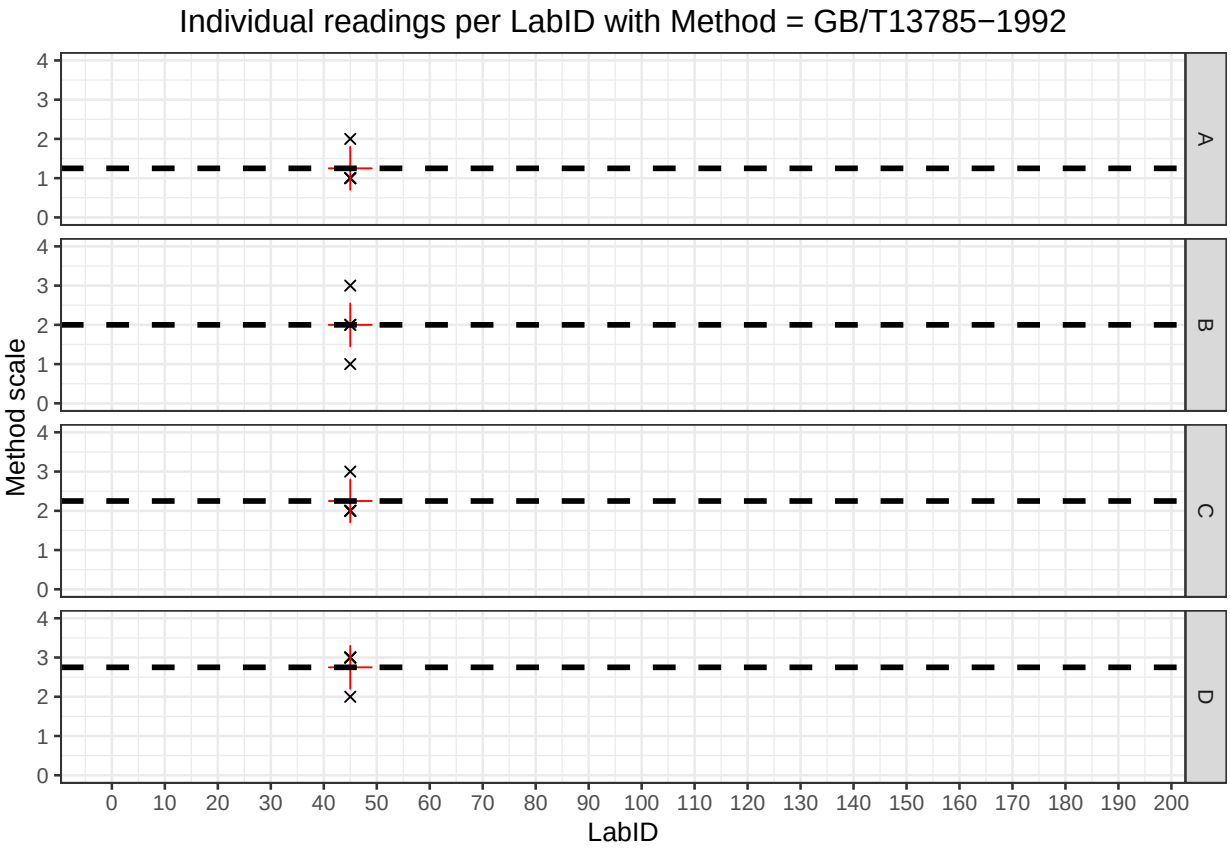
Charts of individual readings per Method and LabID for each cotton [3]

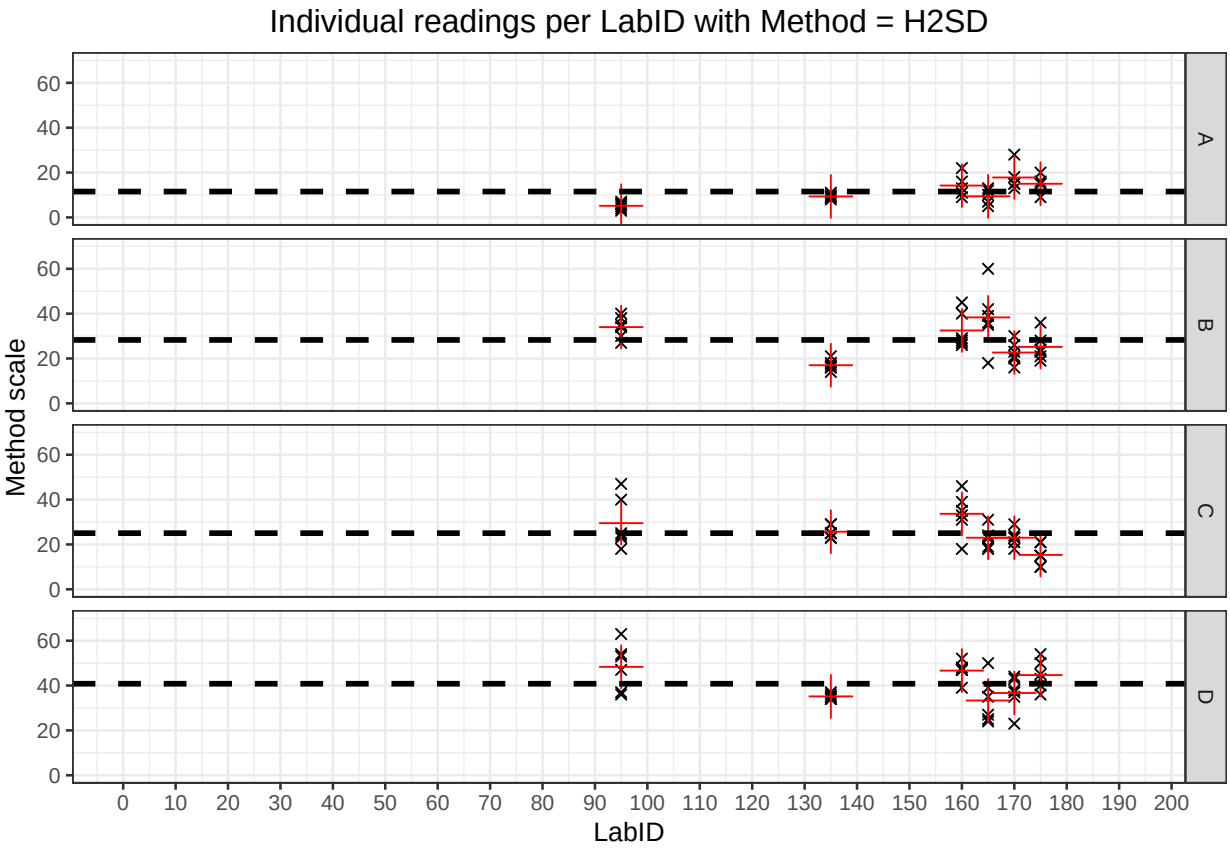


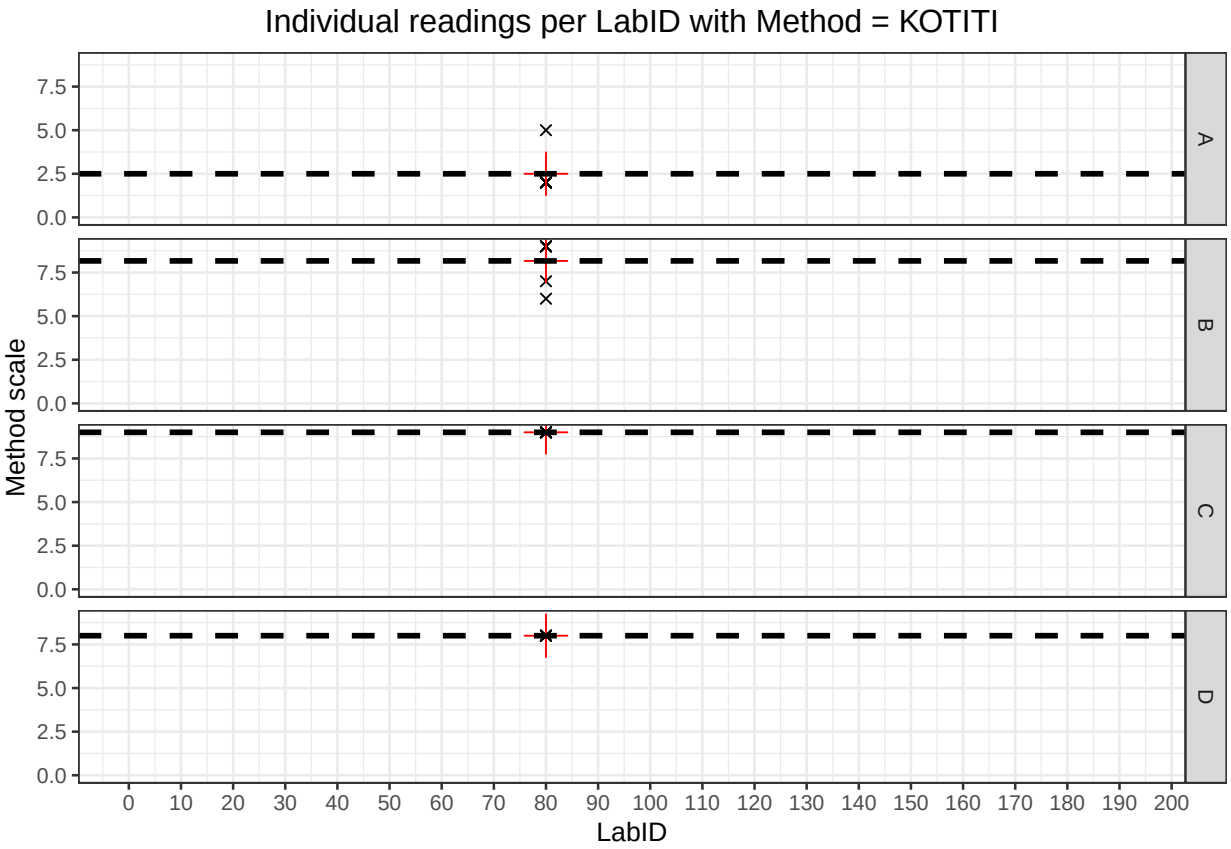
pdf 2

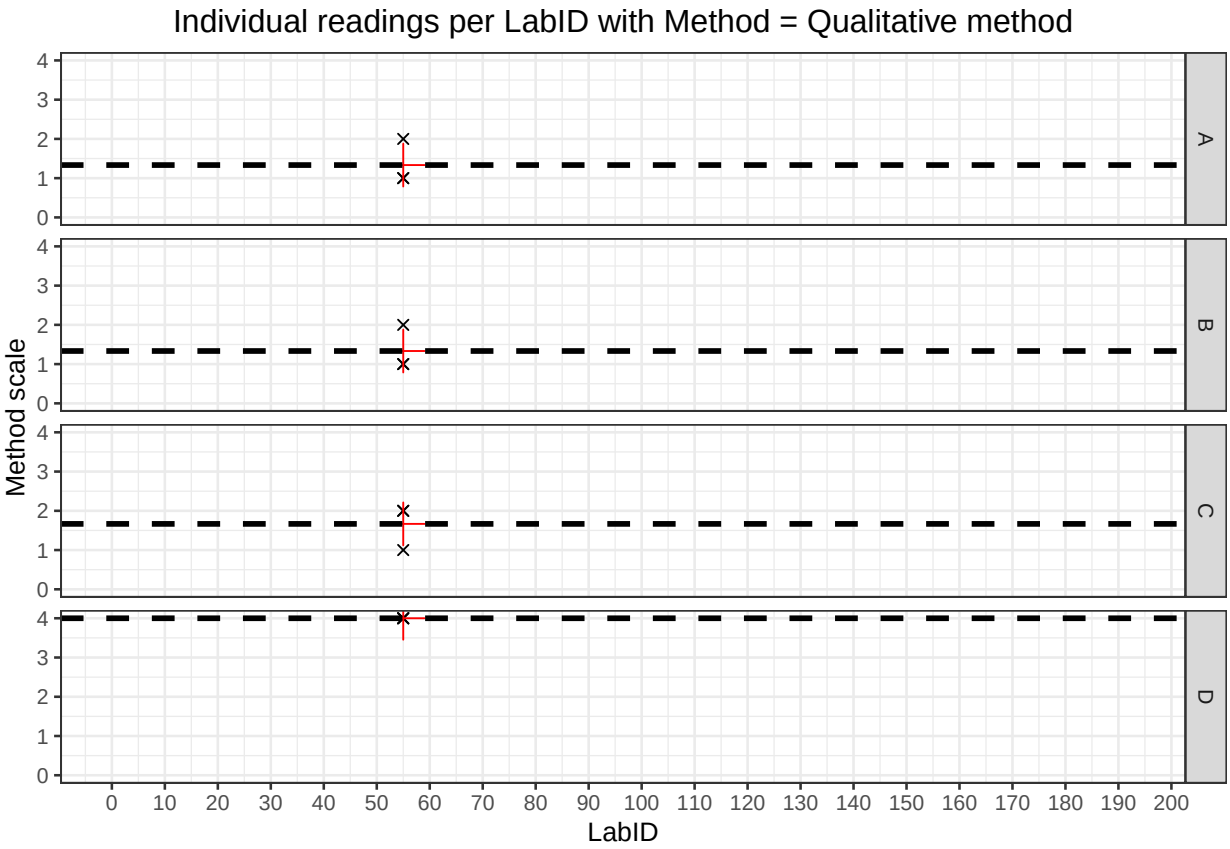
[3] Footnote

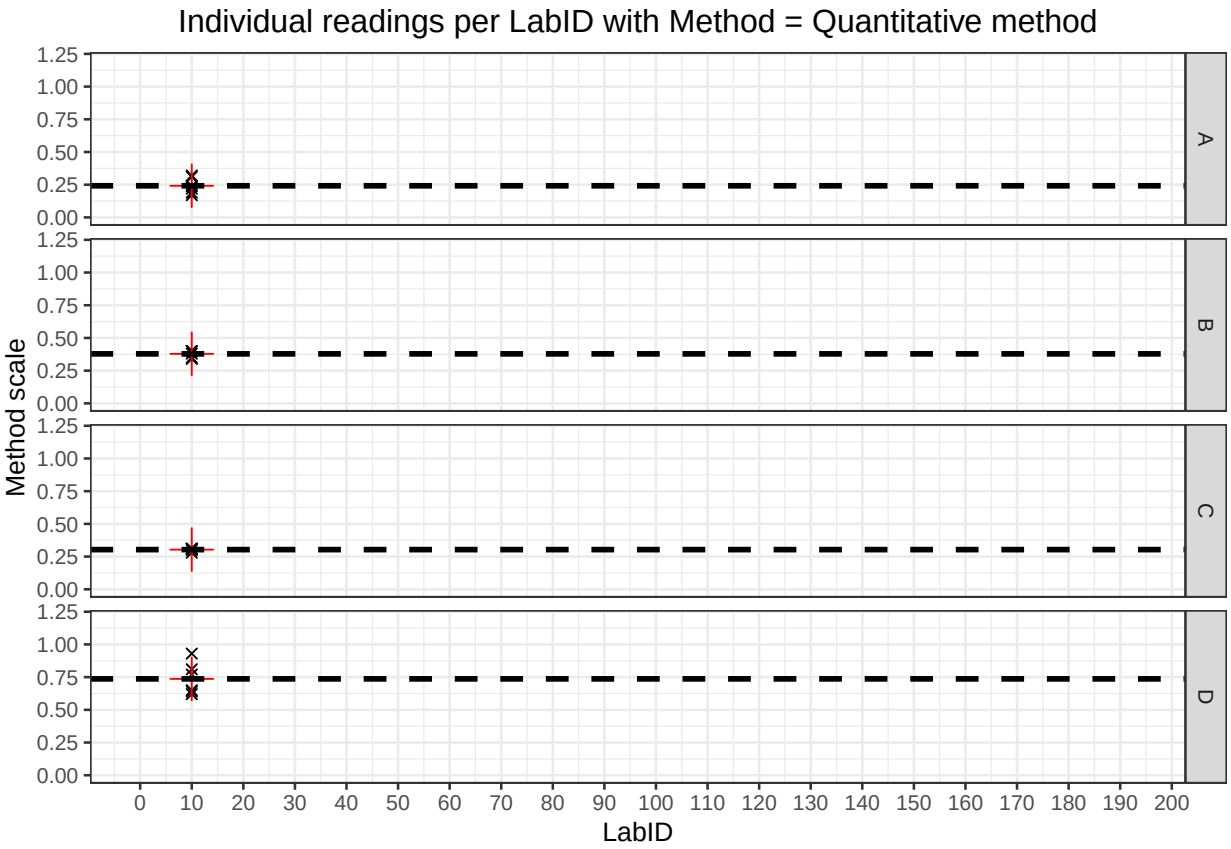
* NA excluded
* LabID are given in the abscissa axis at the bottom of the chart in the following charts.
* Black dashed line = Method GrandMean per cotton.
* Red + = Laboratory mean for the given method and for the given cotton.
* Black x = Laboratory individual reading for the given method and for the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

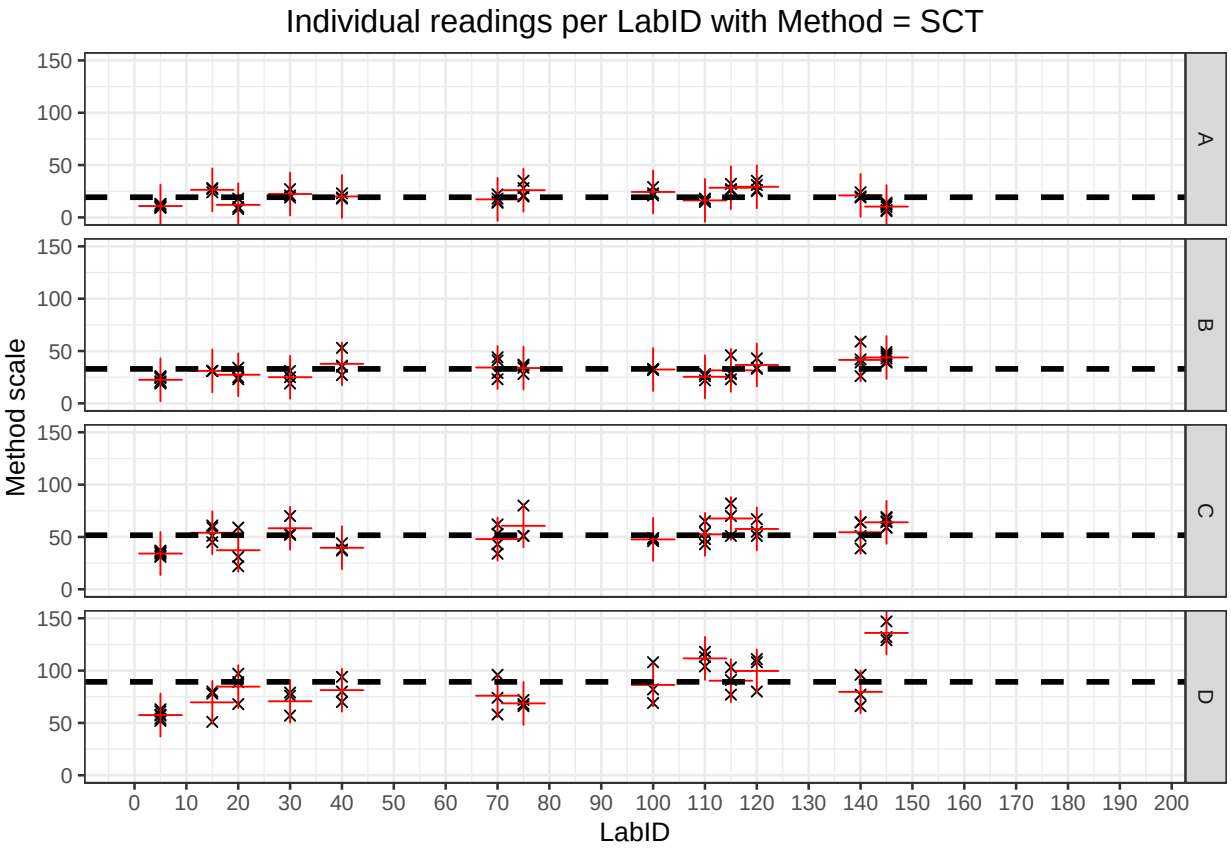

Individual readings per LabID with Method = GB/T13785−1992
Method scale
LabID
A
B
C
D
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
1
2
3
4


Individual readings per LabID with Method = H2SD
Method scale
LabID
A
B
C
D
0
20
40
60
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200


Individual readings per LabID with Method = KOTITI
Method scale
LabID
A
B
C
D
0.0
2.5
5.0
7.5
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200


Individual readings per LabID with Method = Qualitative method
Method scale
LabID
A
B
C
D
0
1
2
3
4
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200


Individual readings per LabID with Method = Quantitative method
Method scale
LabID
A
B
C
D
1.25
1.00
0.75
0.50
0.25
0.00
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

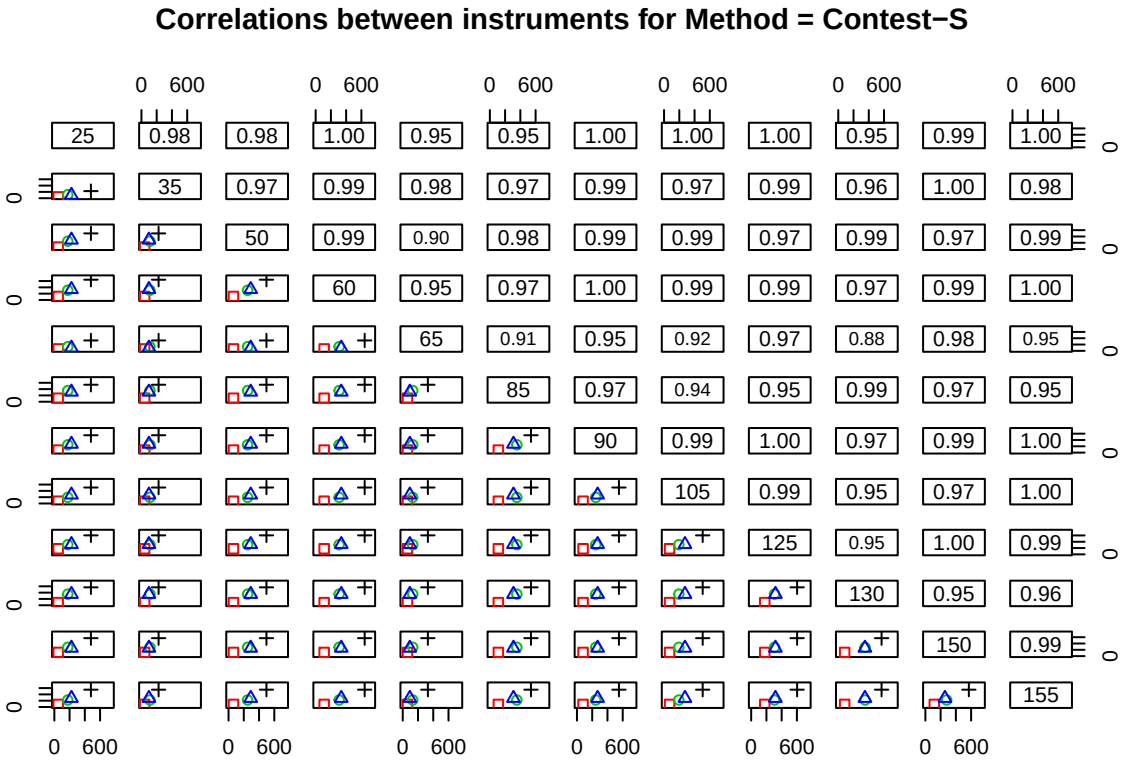

Individual readings per LabID with Method = SCT
Method scale
LabID
A
B
C
D
0
50
100
150
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200

Correlation charts and correlation values between LabID using a same Method for all cottons [4]

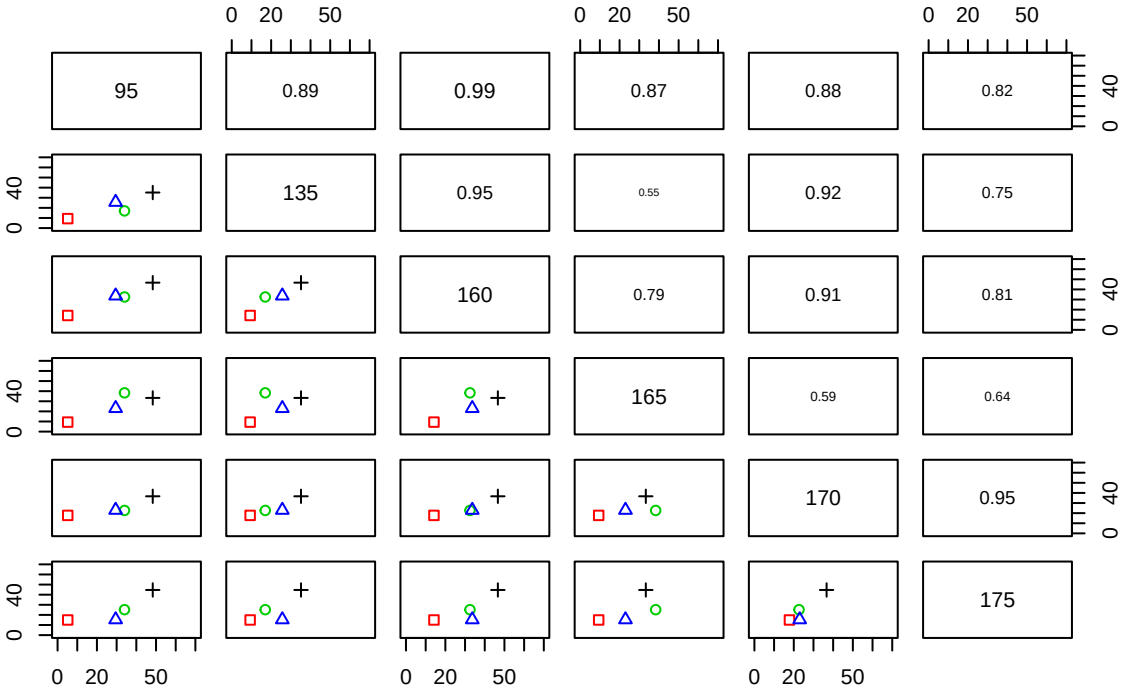
A correlation matrix of charts is provided only when two or more instruments were used for a given method.

[4]Footnote

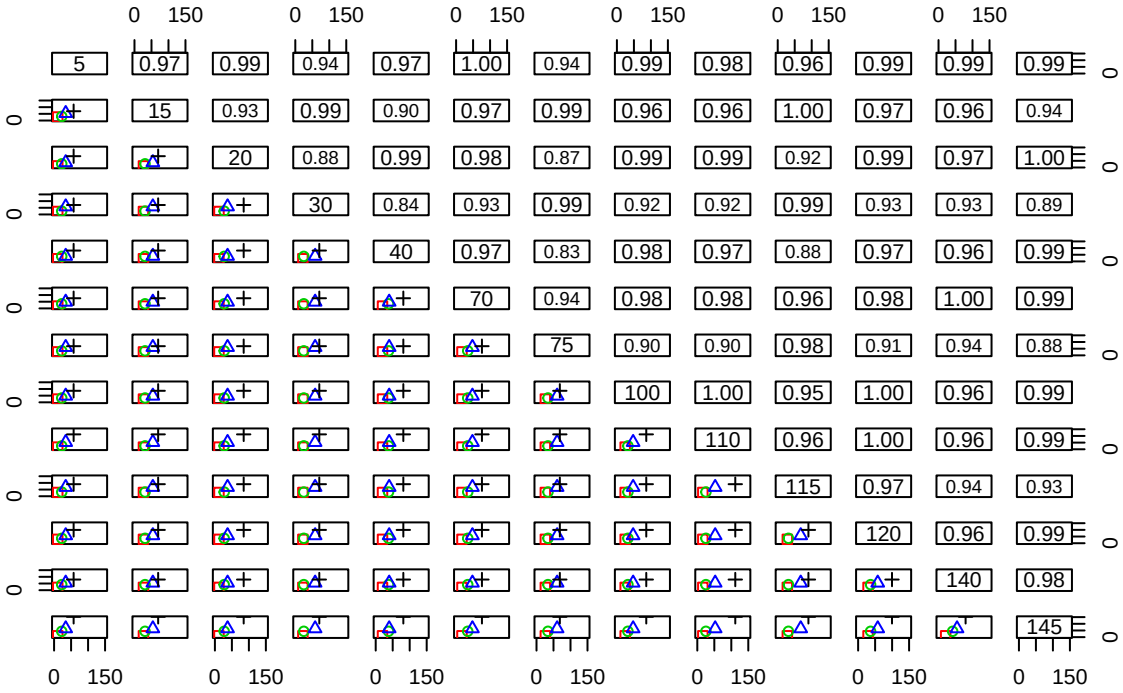
* Based on Means of available results (NA excluded)
* LabIds are given in the diagonal of the matrix.
* Squares in red for Cotton A, rounds in green for Cotton B, triangles in blue for Cotton C, + in black for cotton D, and x in purple for cotton E.
* The lower left corner of the matrix provides the 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
0 600
25
35
50
60
65
85
90
105
125
130
150
155
0.98 0.98 1.00 0.95 0.95 1.00 1.00 1.00 0.95 0.99 1.00
0.97 0.99 0.98 0.97 0.99 0.97 0.99 0.96 1.00 0.98
0.99 0.90 0.98 0.99 0.99 0.97 0.99 0.97 0.99
0.95 0.97 1.00 0.99 0.99 0.97 0.99 1.00
0.91 0.95 0.92 0.97 0.88 0.98 0.95
0.97 0.94 0.95 0.99 0.97 0.95
0.99 1.00 0.97 0.99 1.00
0.99 0.95 0.97 1.00
0.95 1.00 0.99
0.95 0.96
0.99

Correlations between instruments for Method = H2SD



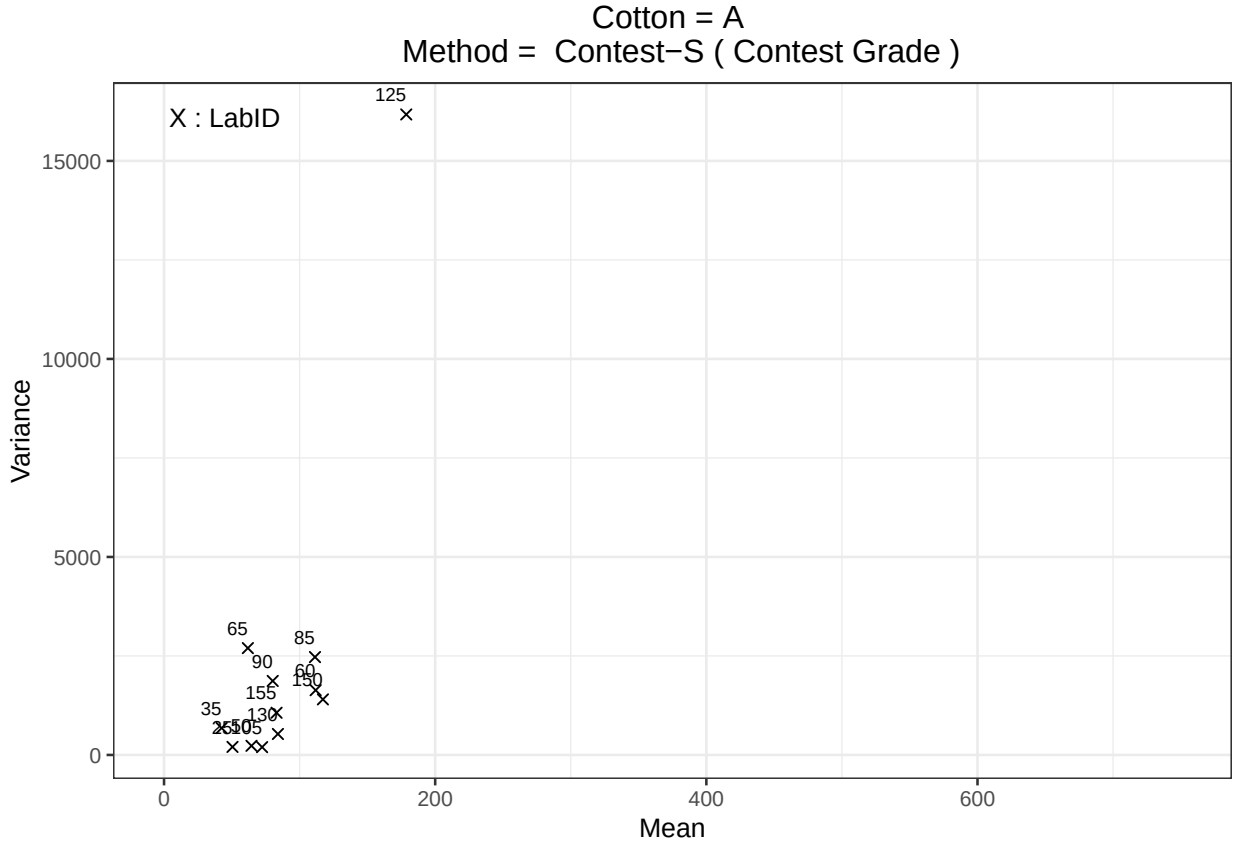
Correlations between instruments for Method = SCT

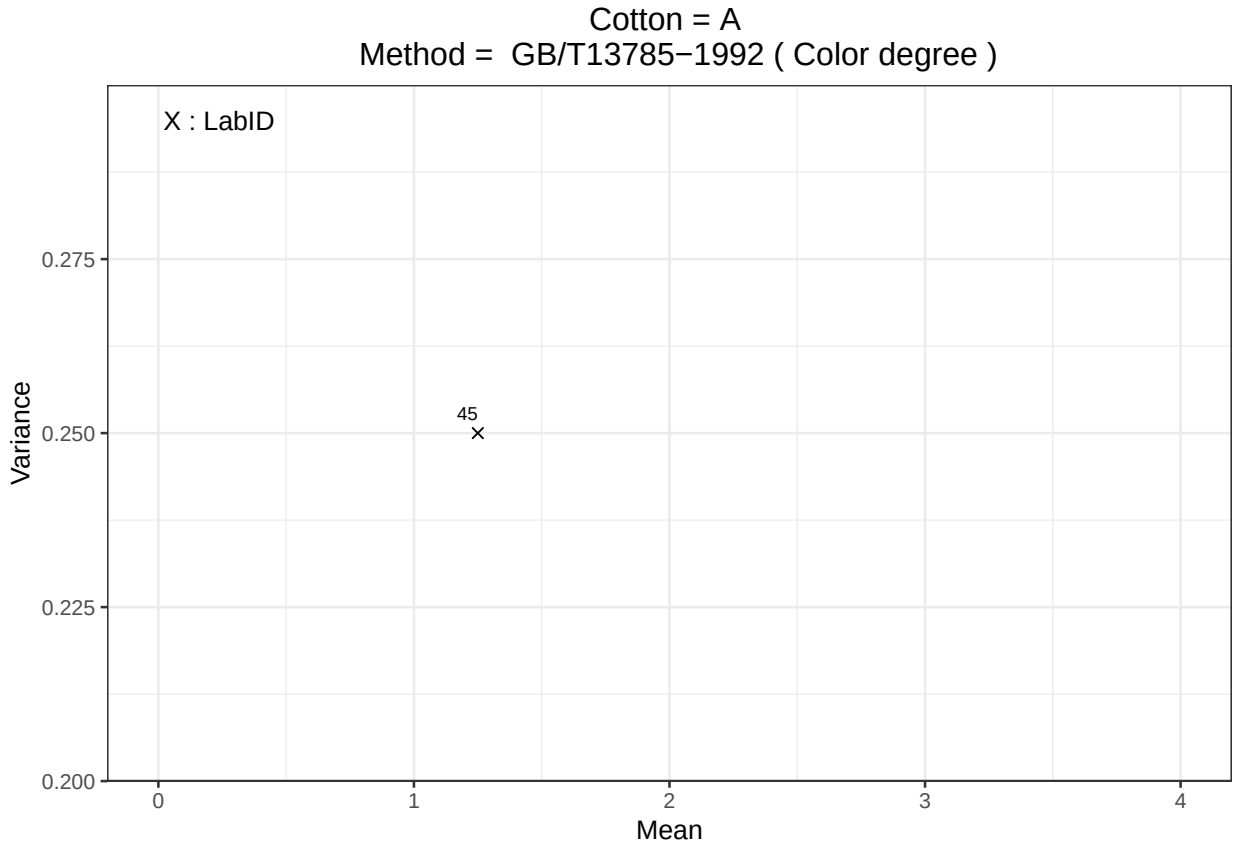


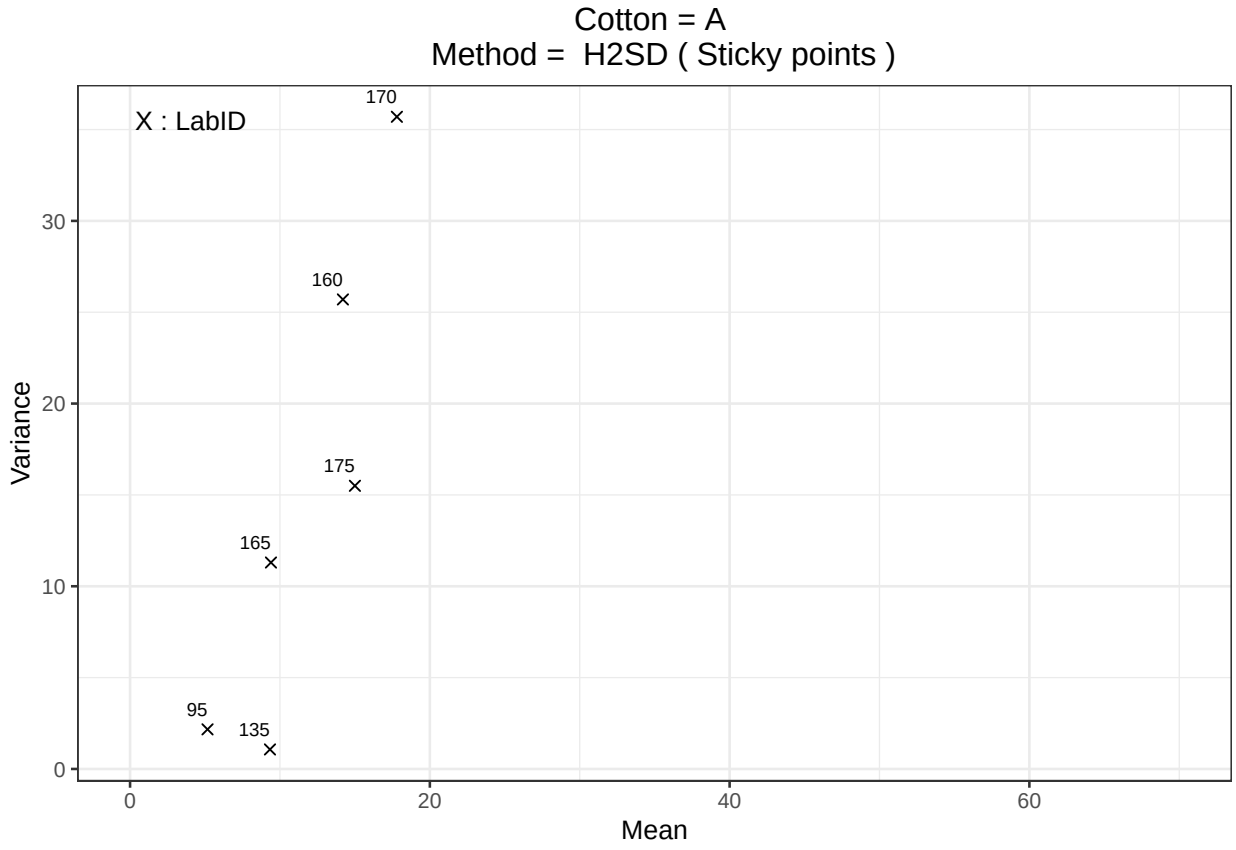
Charts Variance = f(Mean) for each Cotton and Method, taking care of LabIDs

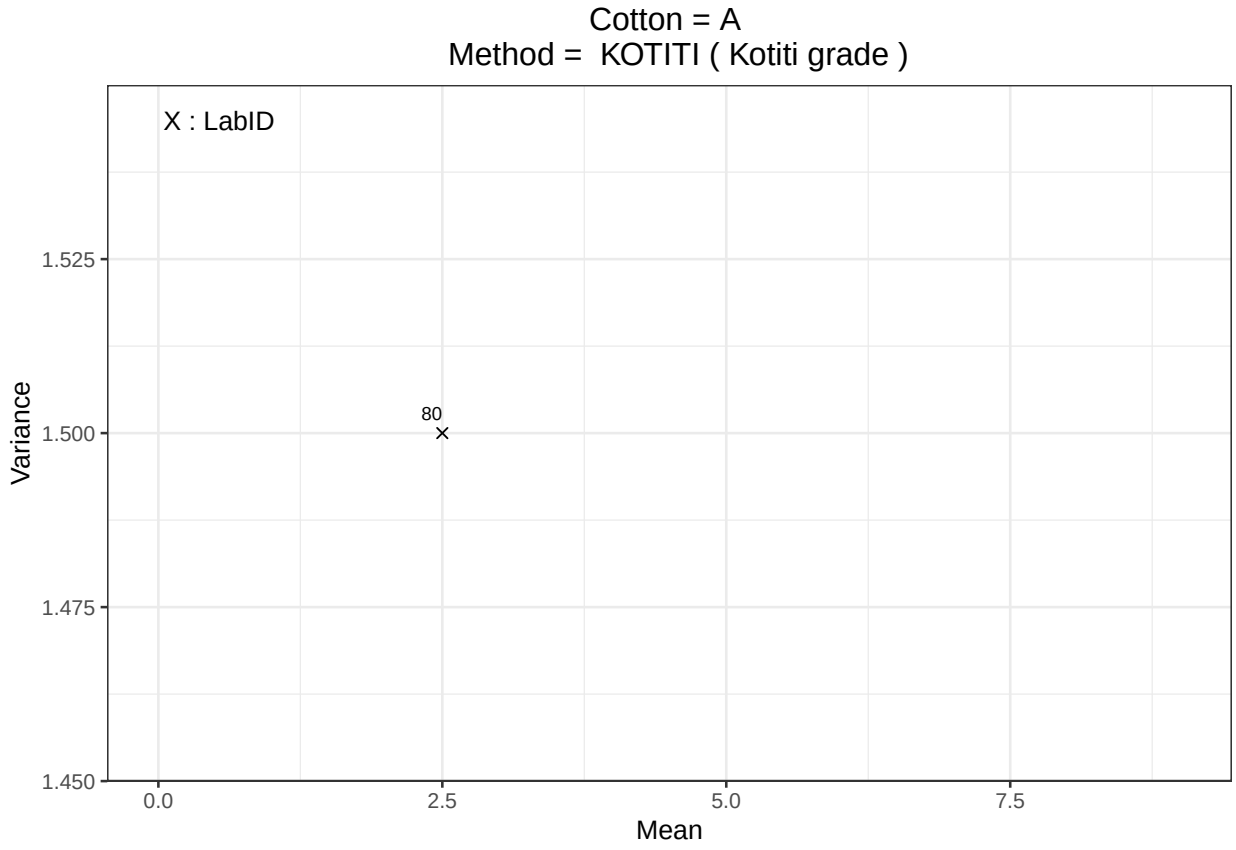
This type of chart is devoted to displaying the ability of laboratories to reproduce themselves for each cotton, based on the n readings (up to six) they provided for each cotton sample. Stickiness has the reputation to be heterogeneously distributed within samples (whatever the efforts we made for homogenizing 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.

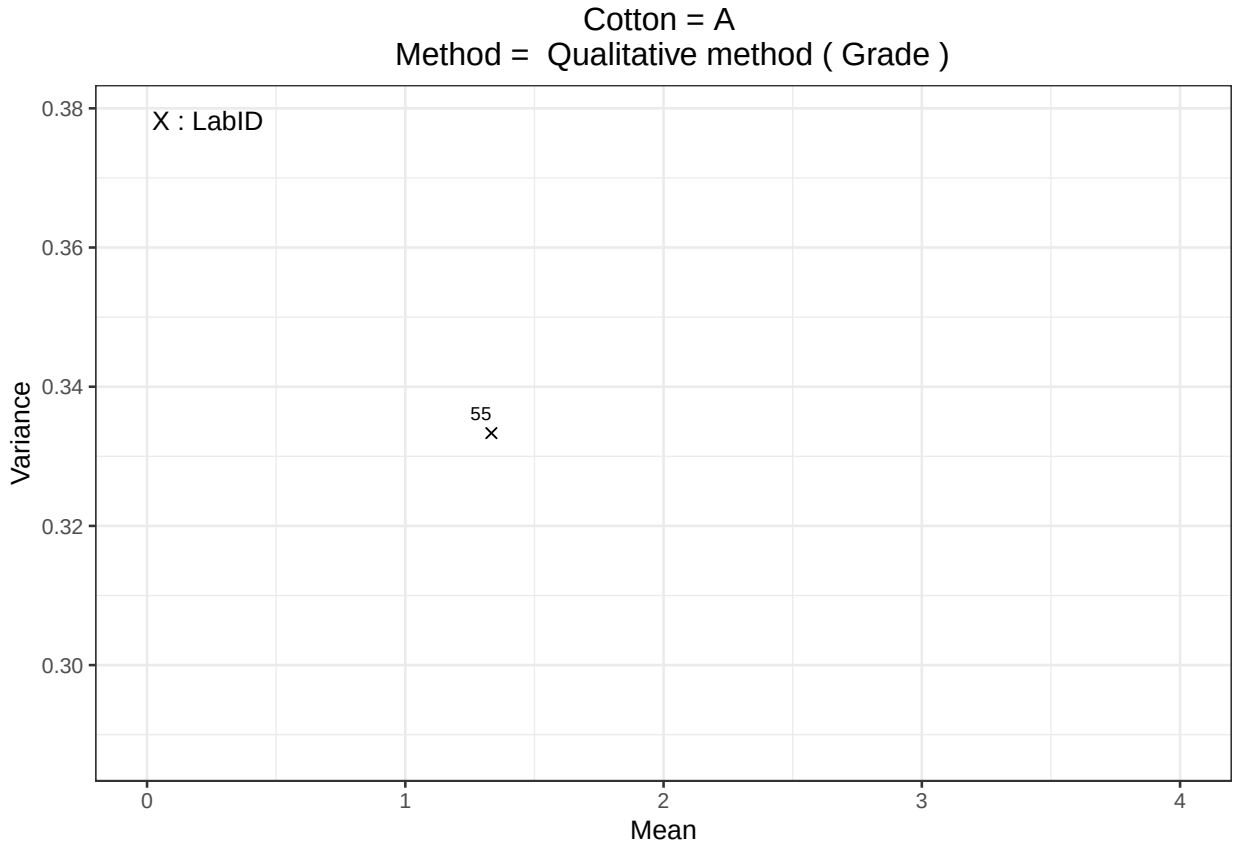
Cotton A : Variance between individual measurements = f(Mean) for all concerned labs

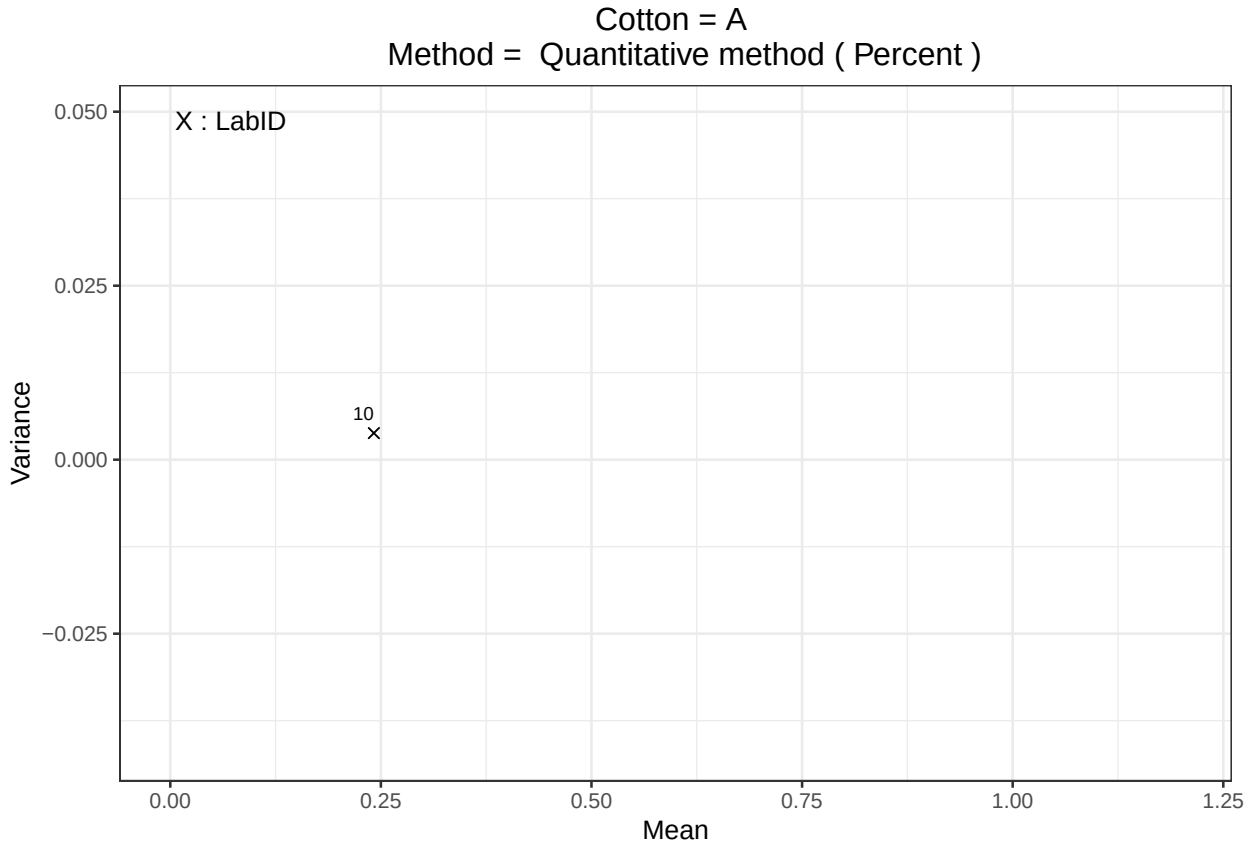


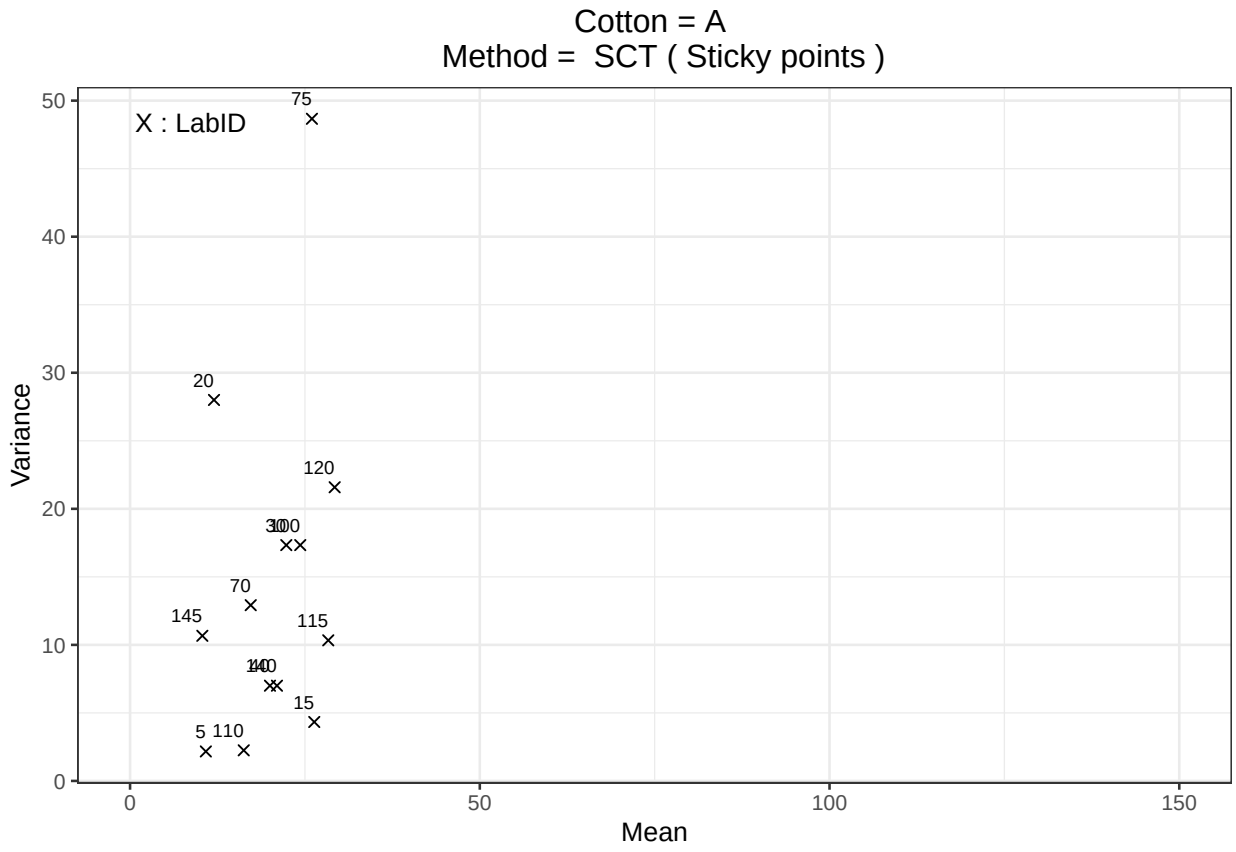

Cotton = A
Method = GB/T13785−1992 (Color degree)
X : LabID
45
Variance
0.275
0.250
0.225
0.200
0
1
2
3
4
Mean


Cotton = A
Method = H2SD (Sticky points)
X : LabID
170
160
175
165
95
135
Variance
Mean
0
10
20
30
0
20
40
60

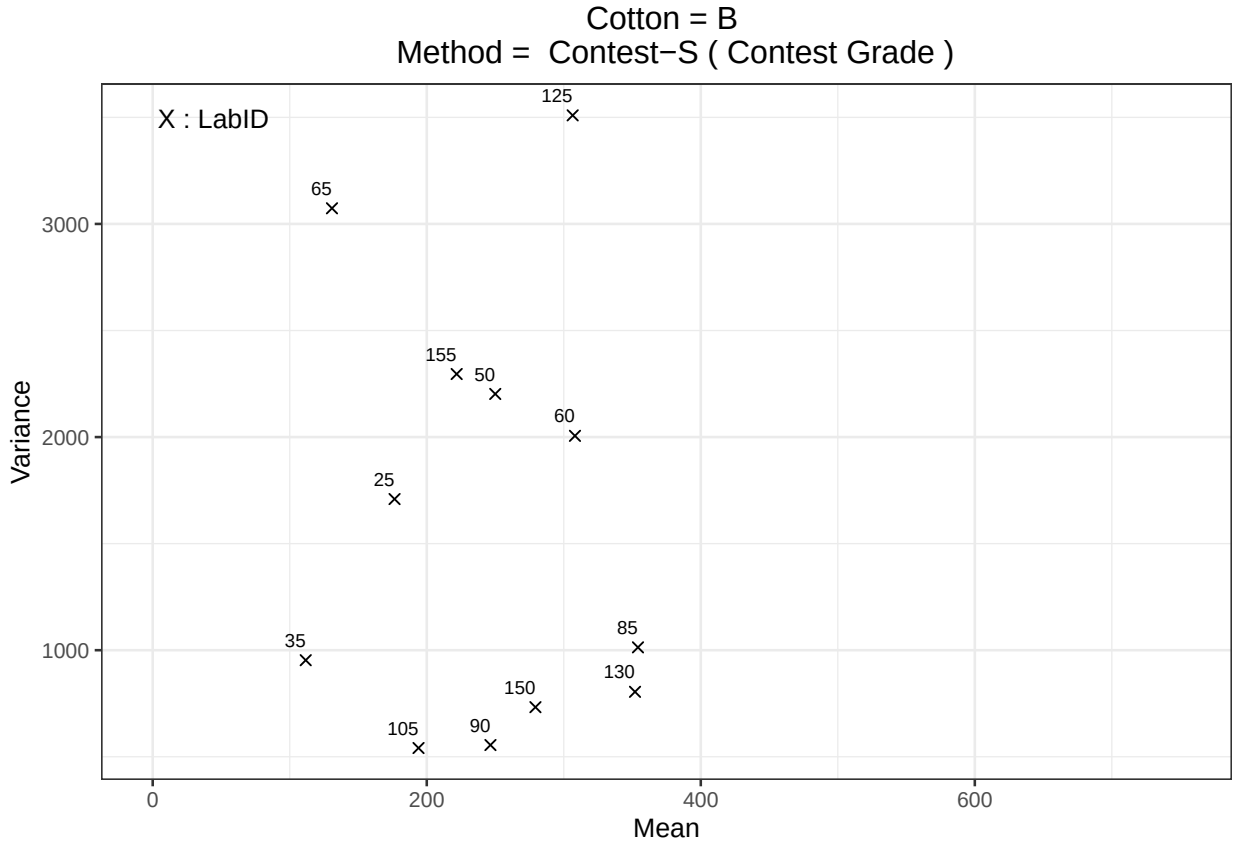

Cotton = A
Method = KOTITI (Kotiti grade)
X : LabID
80
Variance
1.525
1.500
1.475
1.450
0.0
2.5
5.0
7.5
Mean

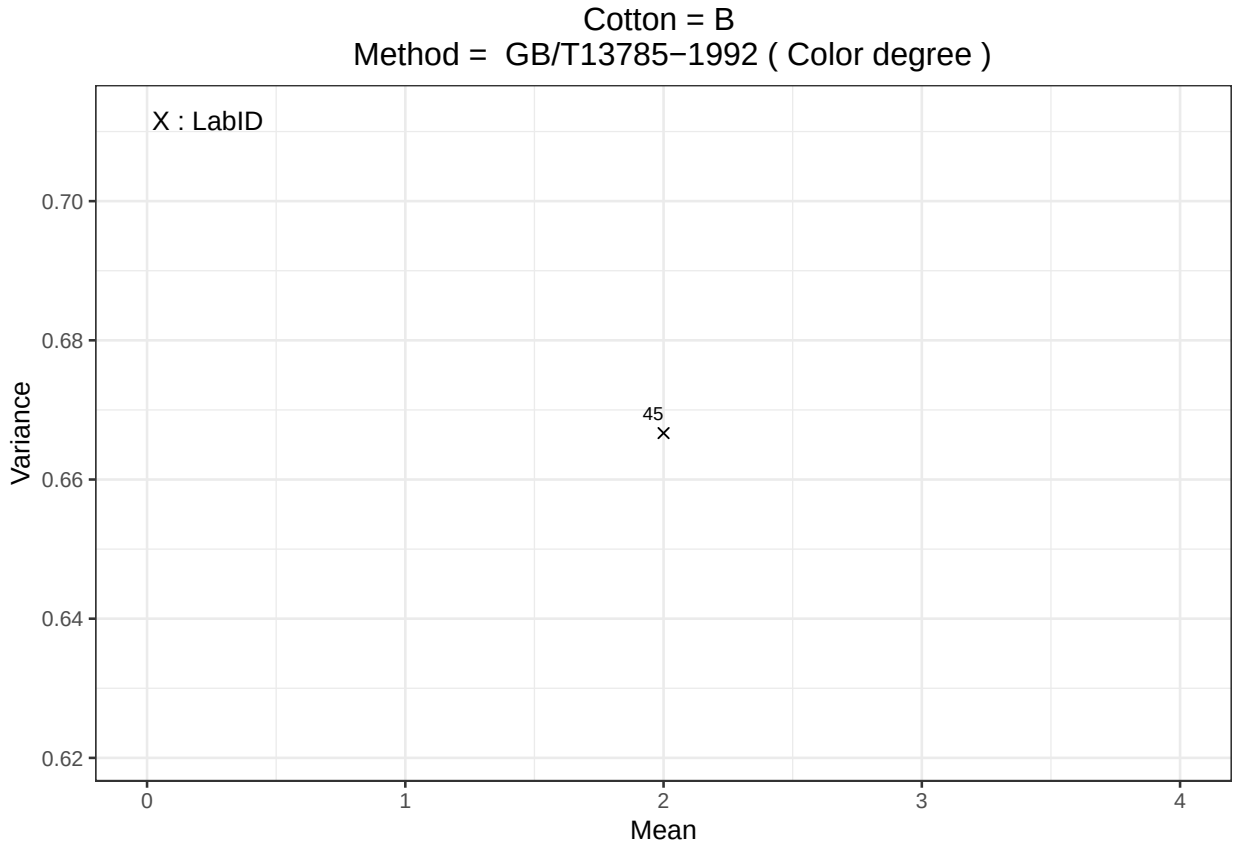

Cotton = A
Method = Qualitative method (Grade)
X : LabID
55
Variance
Mean
0.38
0.36
0.34
0.32
0.30
0
1
2
3
4

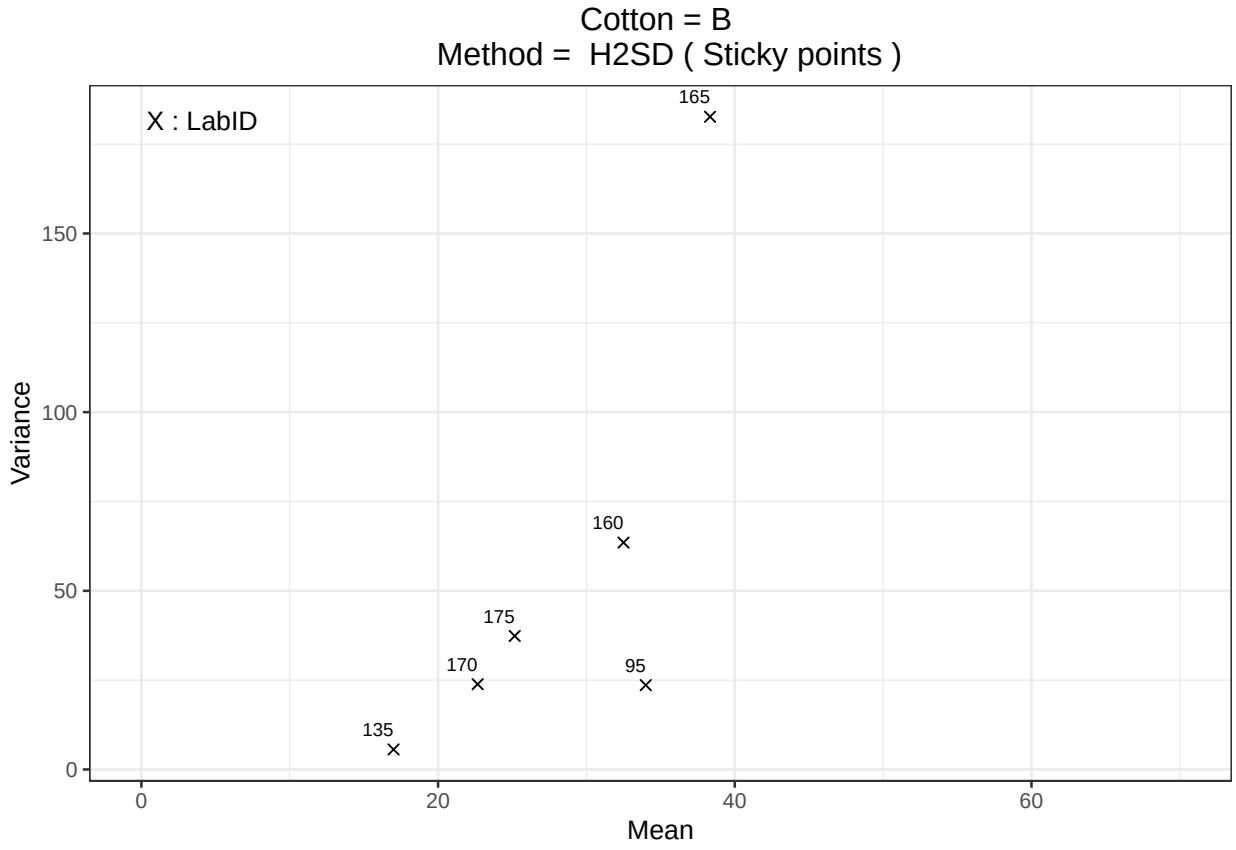

Cotton = A
Method = Quantitative method (Percent)
X : LabID
10
Variance
Mean
0.050
0.025
0.000
−0.025
0.00
0.25
0.50
0.75
1.00
1.25

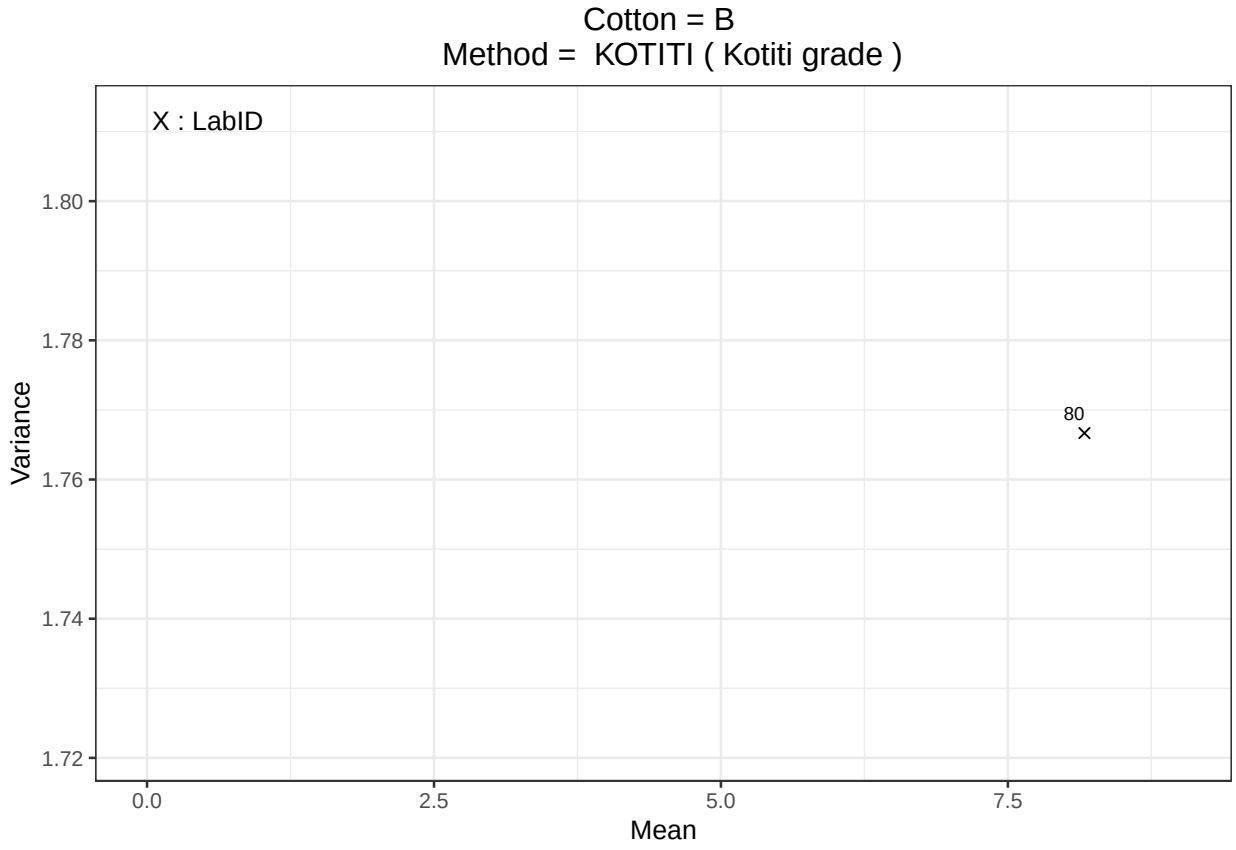

Cotton = A
Method = SCT (Sticky points)
X : LabID
Variance
Mean
0
10
20
30
40
50
0
50
100
150
75
20
120
70
145
115
15
5
110

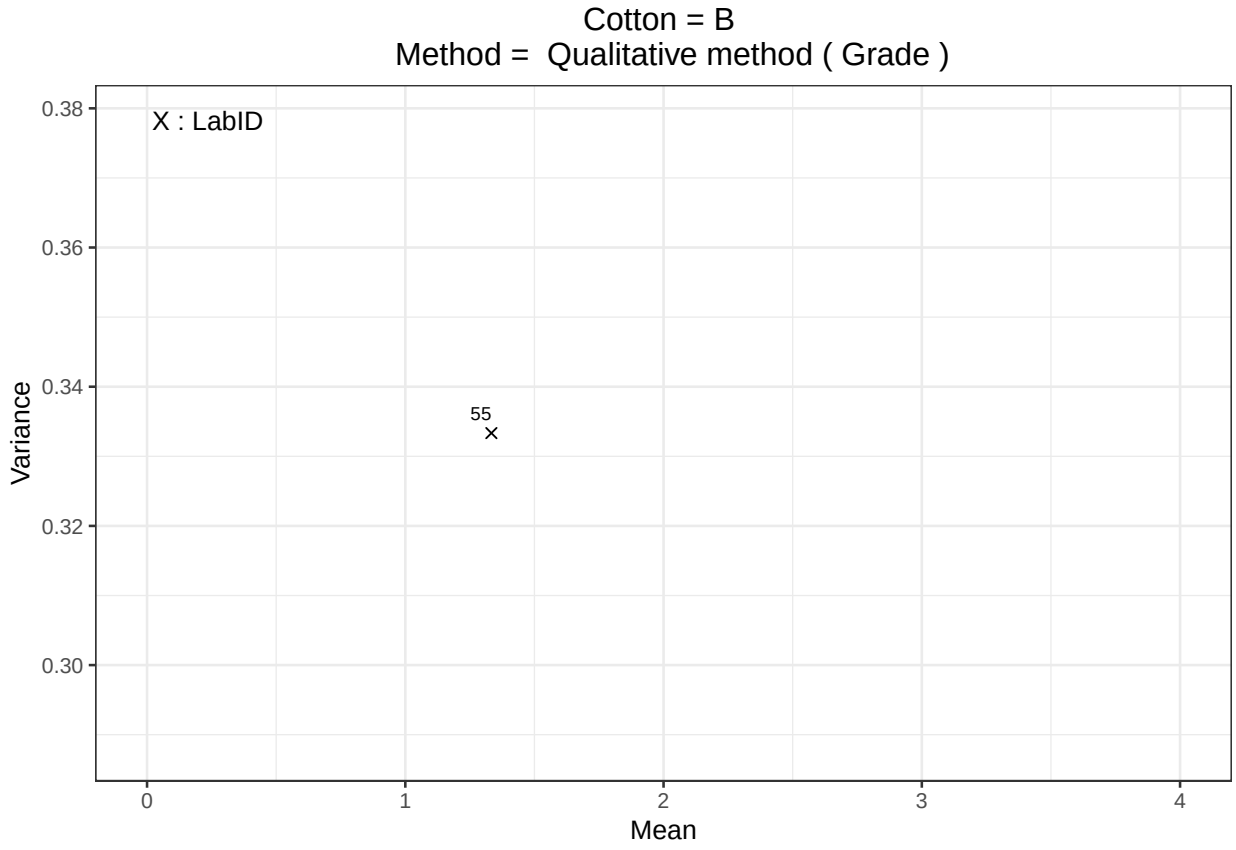
Cotton B : Variance between individual measurements = f(Mean) for all concerned labs

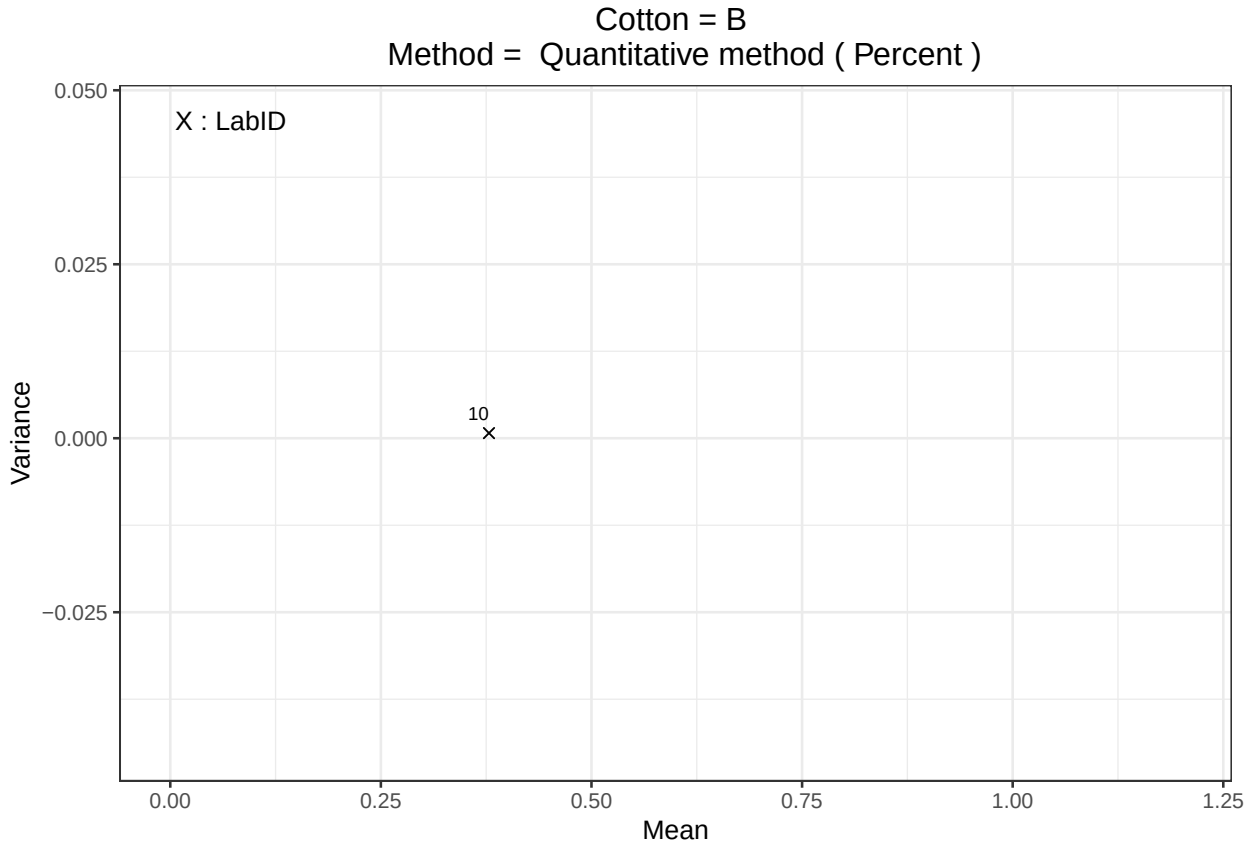


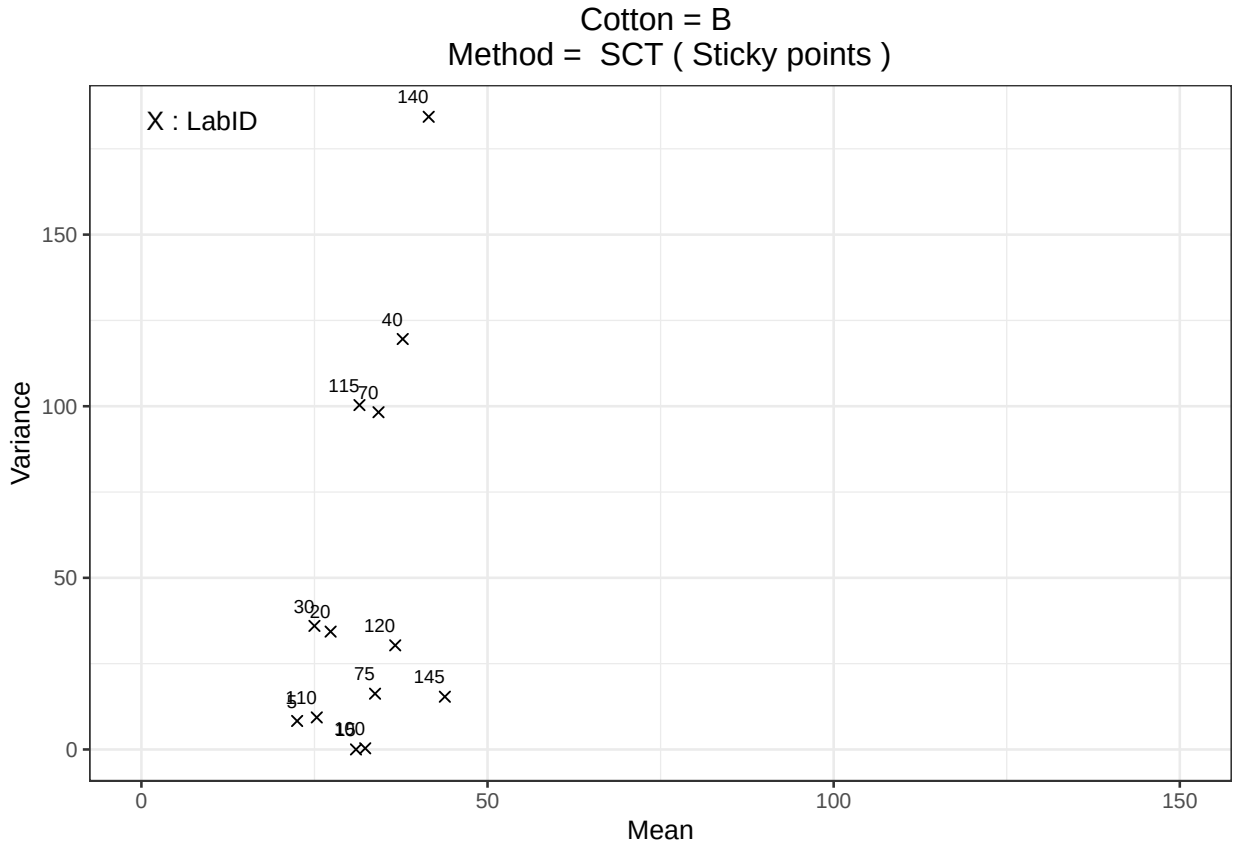

Cotton = B
Method = GB/T13785−1992 (Color degree)
X : LabID
0.70
0.68
0.66
0.64
0.62
Variance
45
0
1
2
3
4
Mean


Cotton = B
Method = H2SD (Sticky points)
X : LabID
165
160
175
170
95
135
Variance
Mean
0
50
100
150
0
20
40
60

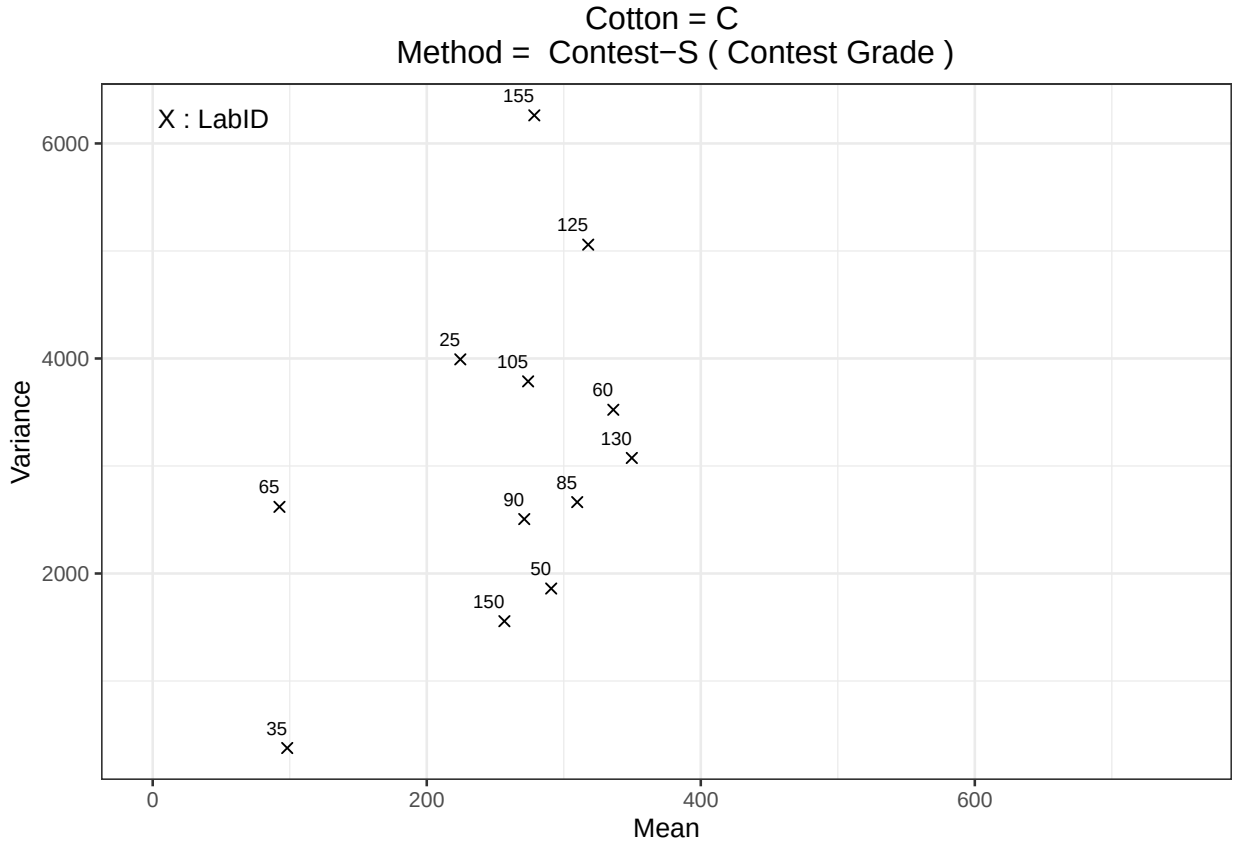

Cotton = B
Method = KOTITI (Kotiti grade)
X : LabID
1.80
1.78
1.76
1.74
1.72
Variance
80
0.0
2.5
5.0
7.5
Mean

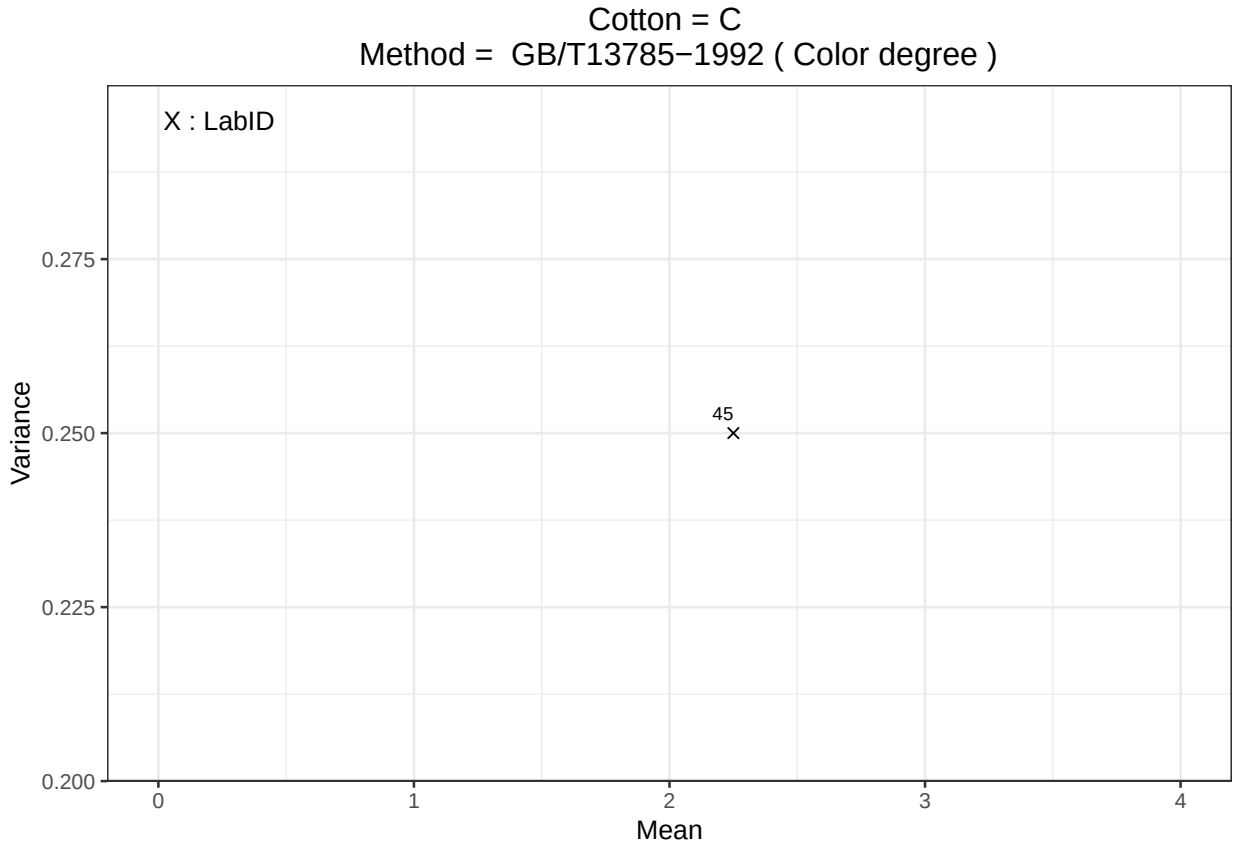

Cotton = B
Method = Qualitative method (Grade)
X : LabID
55
Variance
0.38
0.36
0.34
0.32
0.30
0
1
2
3
4
Mean

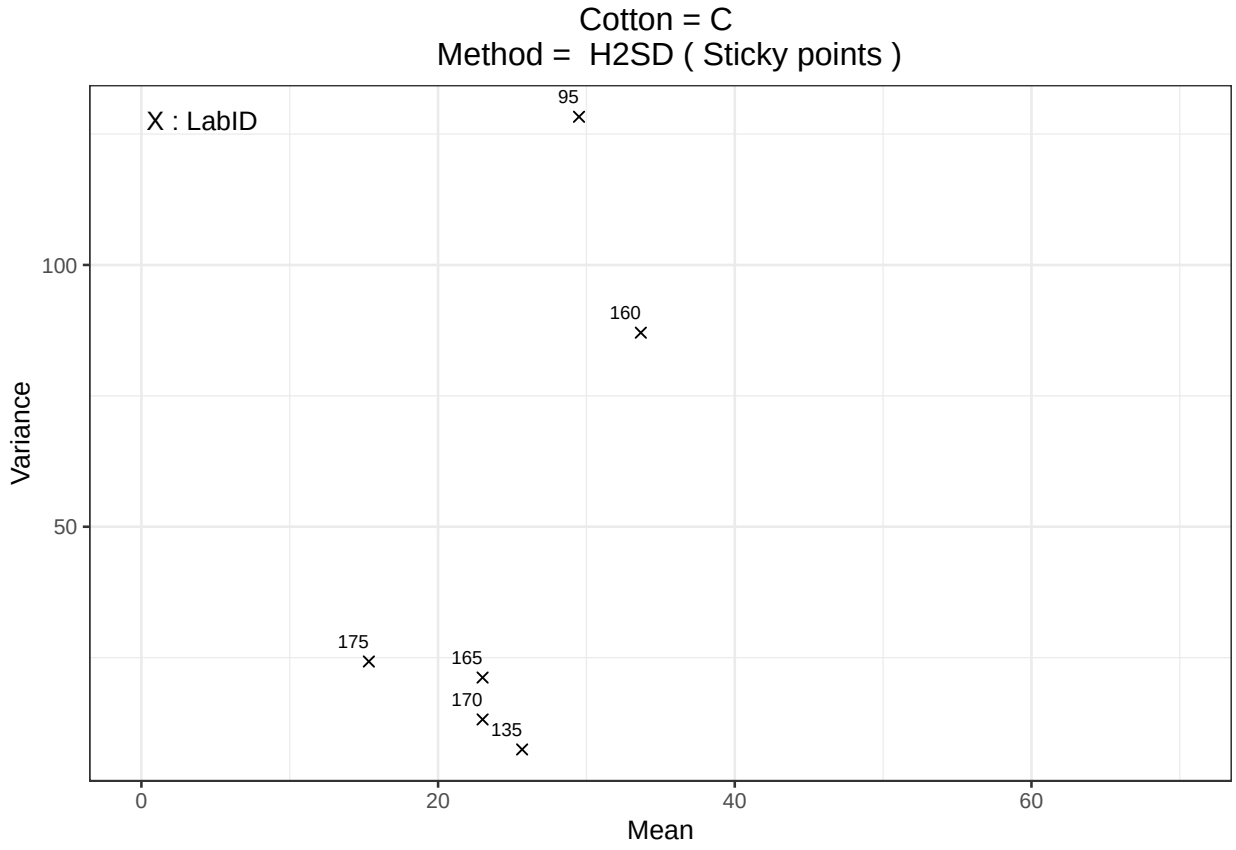

Cotton = B
Method = Quantitative method (Percent)
X : LabID
10
Variance
Mean
0.050
0.025
0.000
−0.025
0.00
0.25
0.50
0.75
1.00
1.25

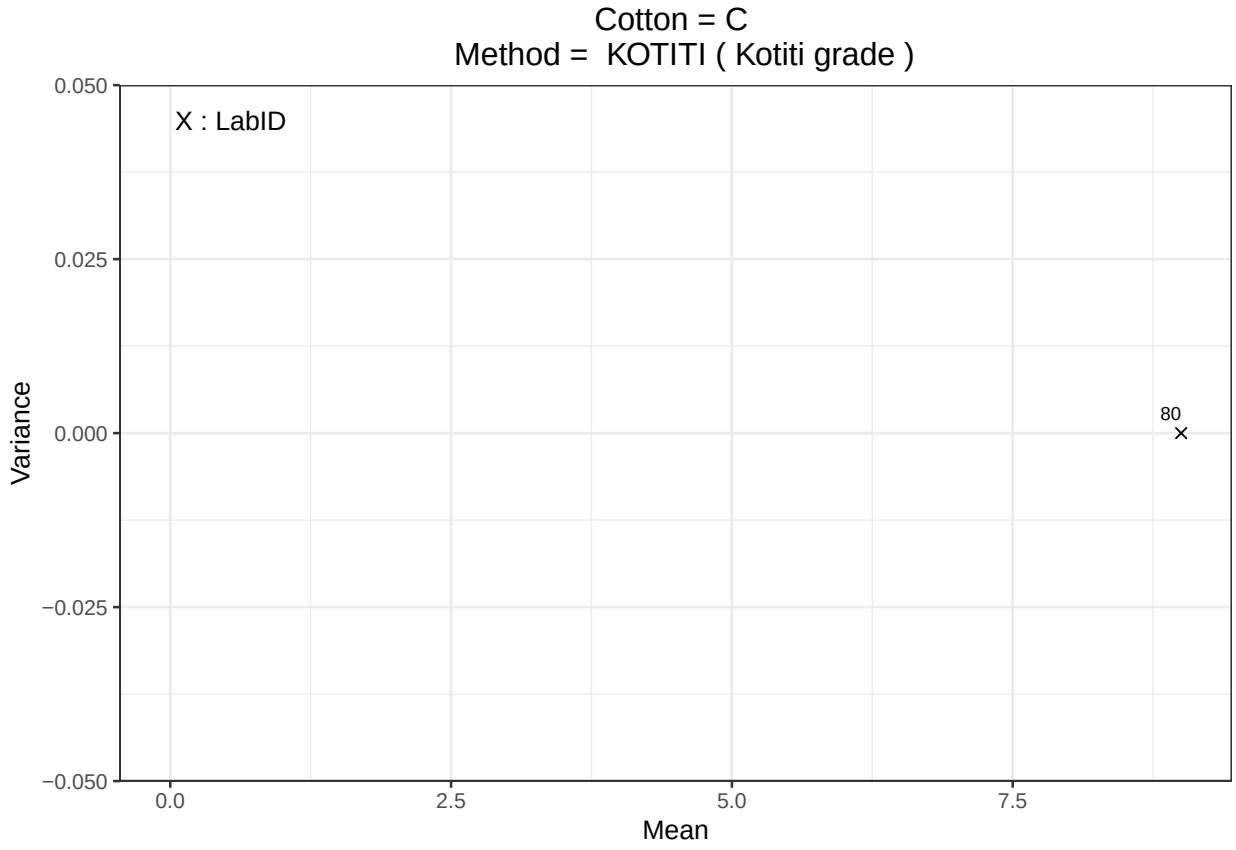

Cotton = B
Method = SCT (Sticky points)
X : LabID
140
40
115
70
30
20
120
75
145
110
5
150
100
50
0
Variance
0
50
100
150
Mean

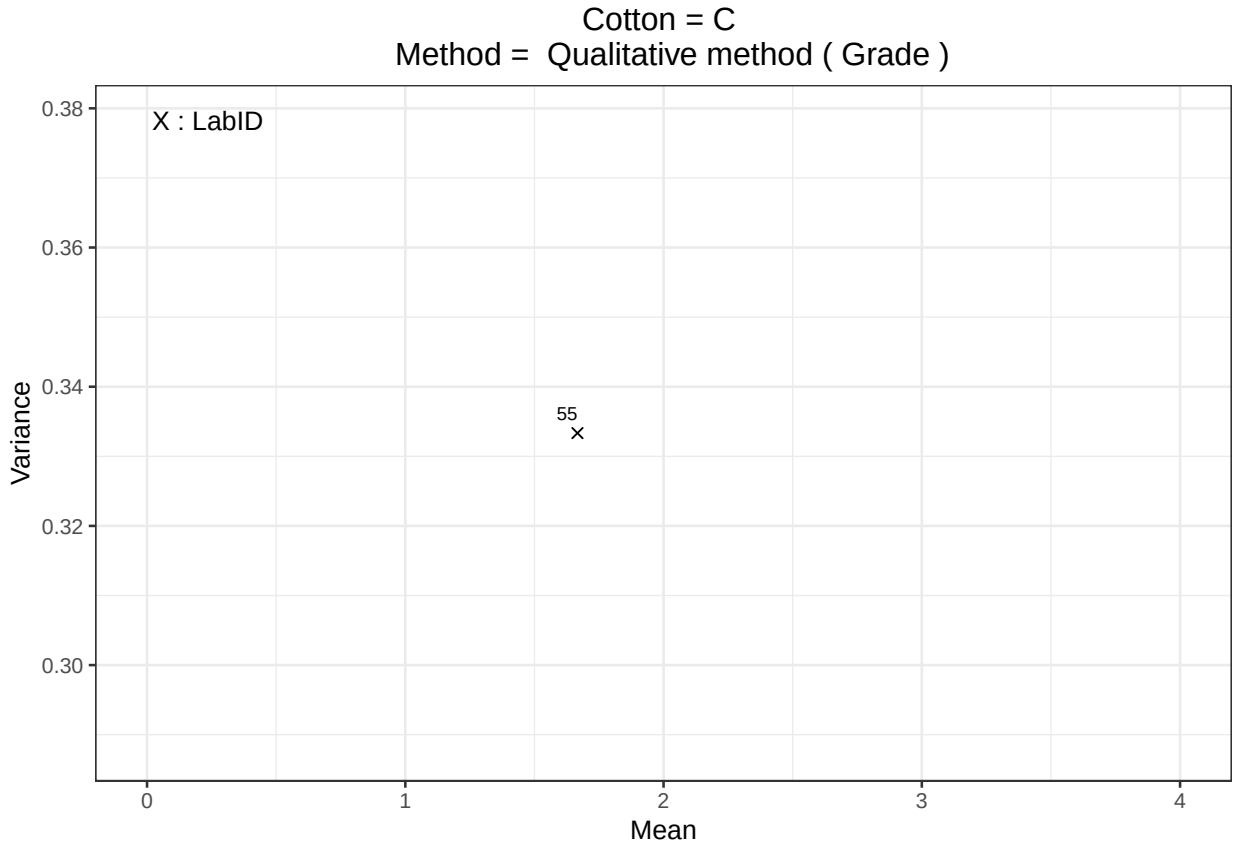
Cotton C : Variance between individual measurements = f(Mean) for all concerned labs

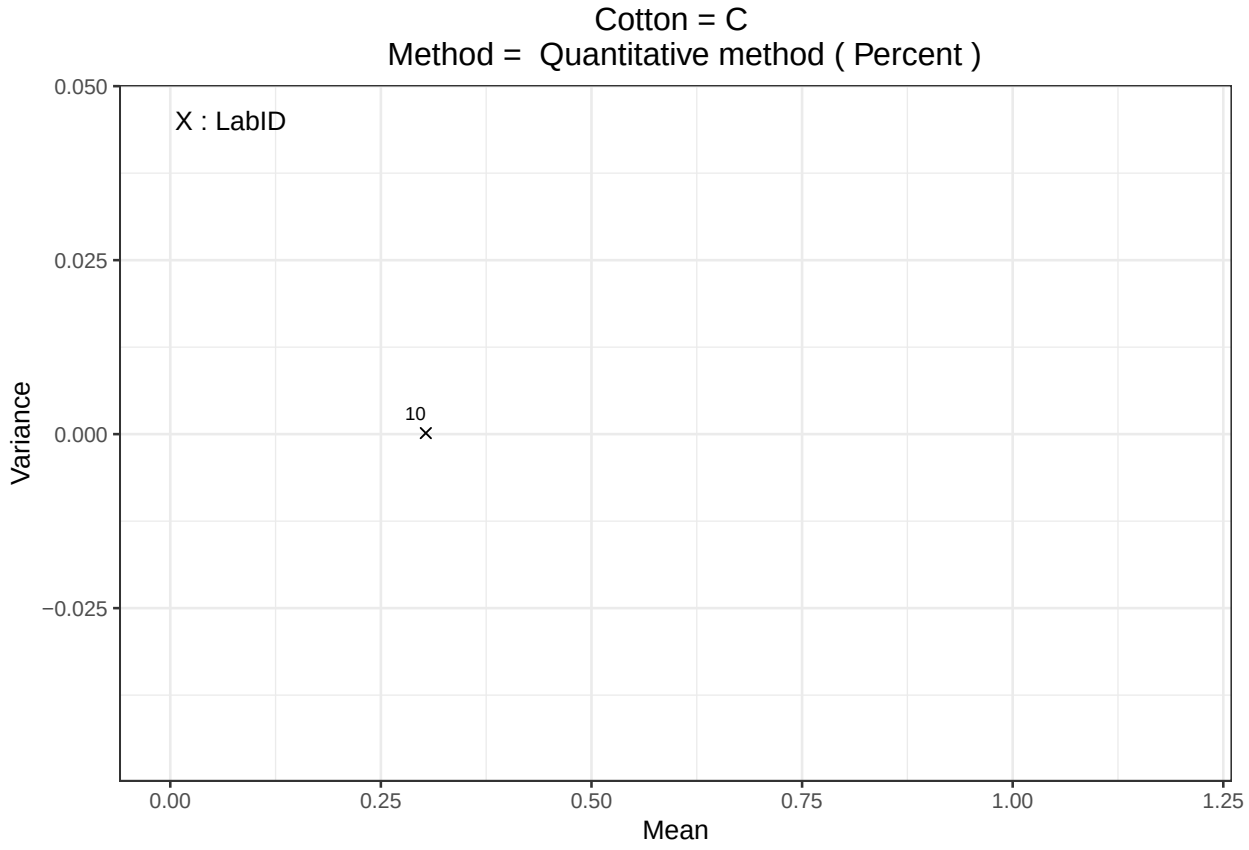


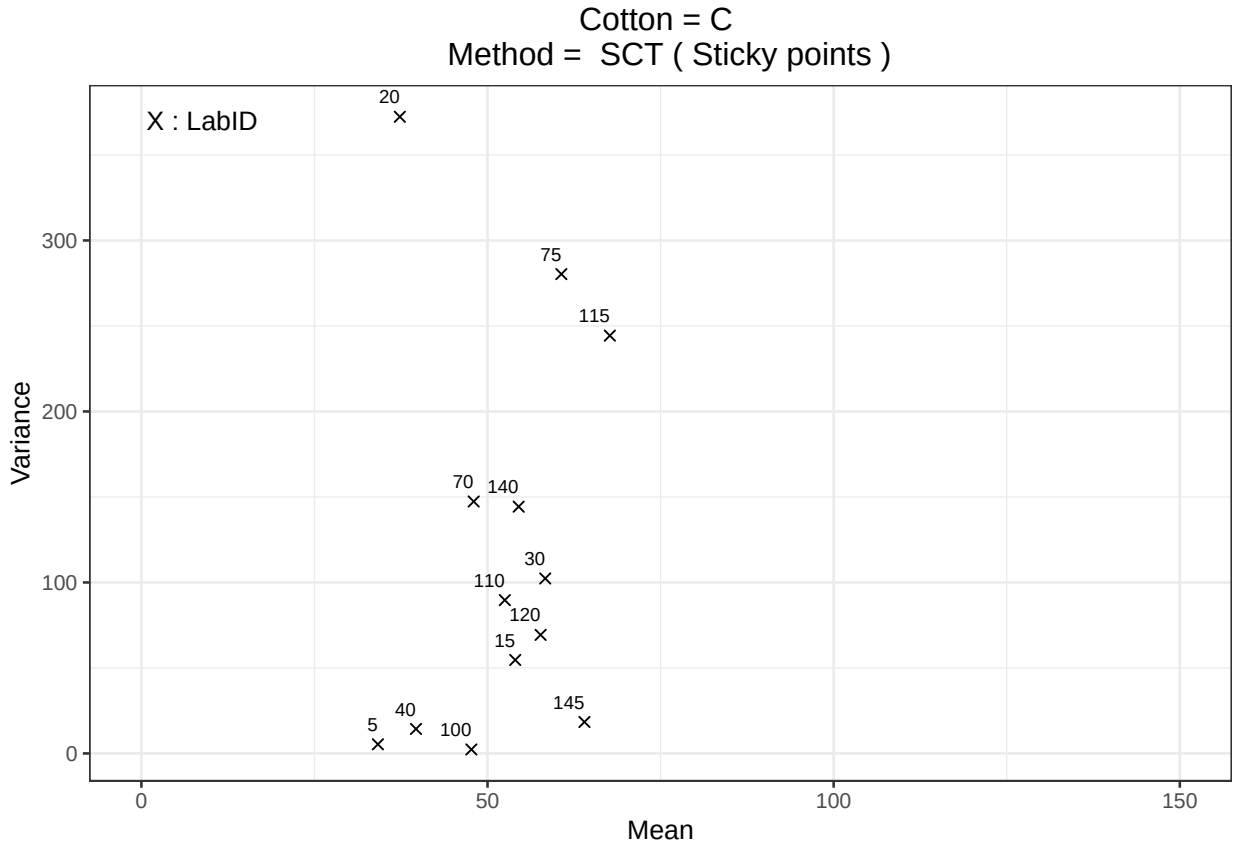

Cotton = C
Method = GB/T13785−1992 (Color degree)
X : LabID
0.275
0.250
0.225
0.200
Variance
45
0
1
2
3
4
Mean


Cotton = C
Method = H2SD (Sticky points)
X : LabID
95
160
175
165
170
135
100
50
Variance
0
20
40
60
Mean

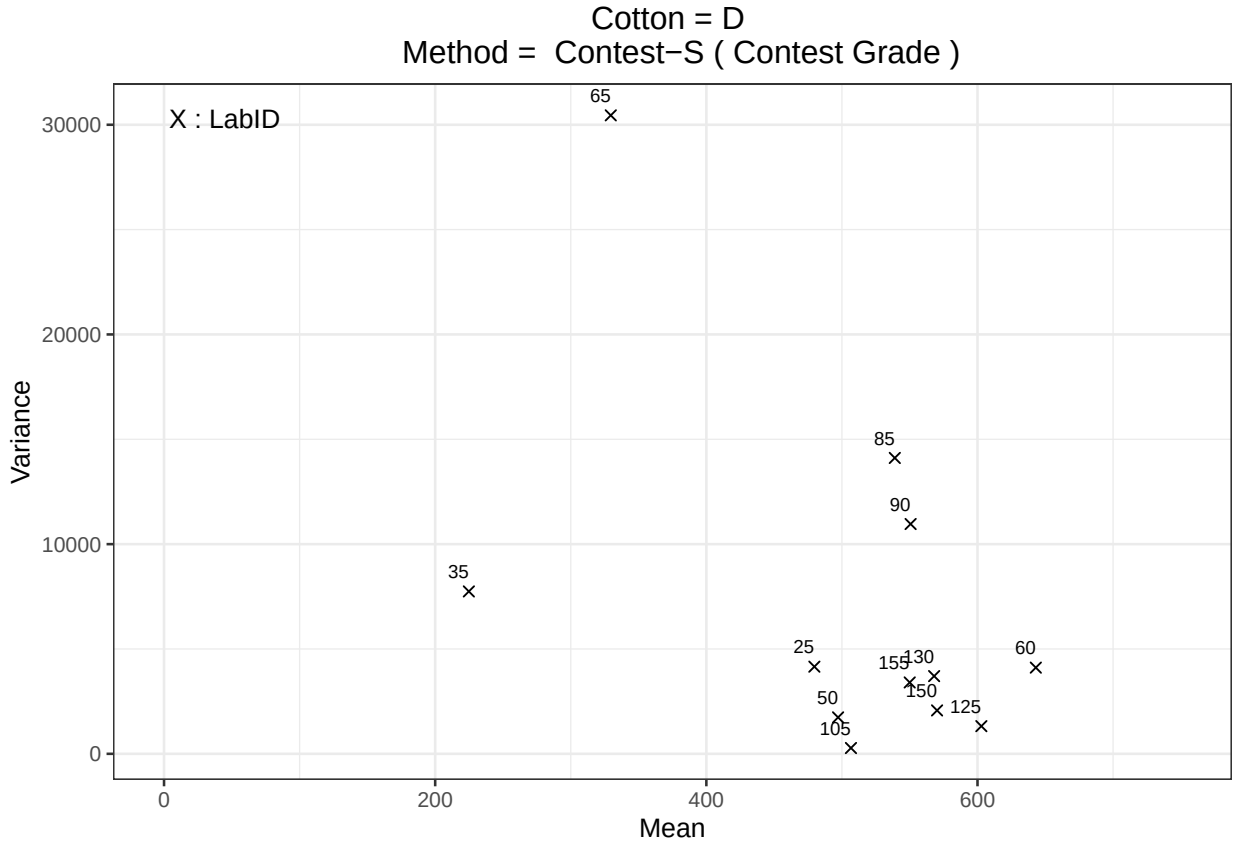

Cotton = C
Method = KOTITI (Kotiti grade)
X : LabID
0.050
0.025
0.000
−0.025
−0.050
Variance
80
0.0
2.5
5.0
7.5
Mean

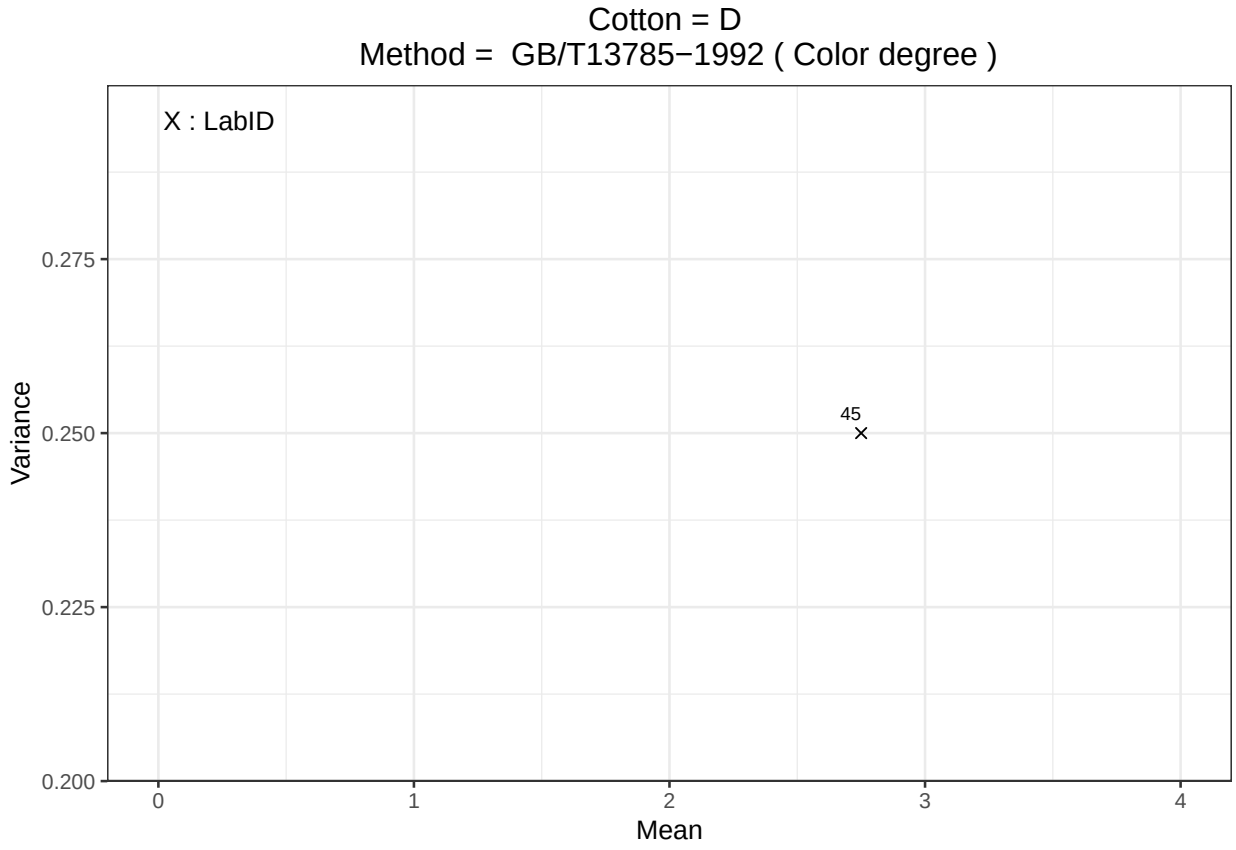

Cotton = C
Method = Qualitative method (Grade)
X : LabID
55
Variance
0.38
0.36
0.34
0.32
0.30
0
1
2
3
4
Mean

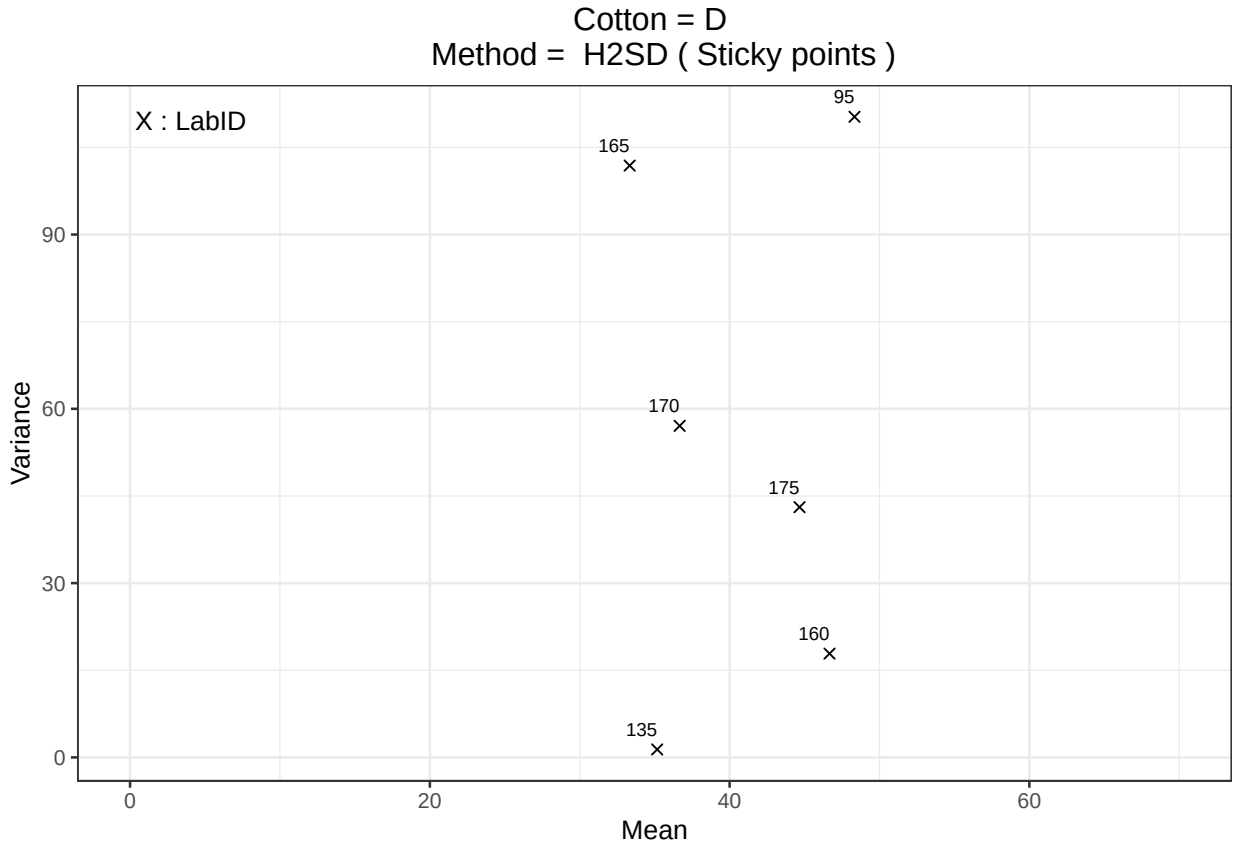

Cotton = C
Method = Quantitative method (Percent)
X : LabID
10
Variance
Mean
0.050
0.025
0.000
−0.025
0.00
0.25
0.50
0.75
1.00
1.25

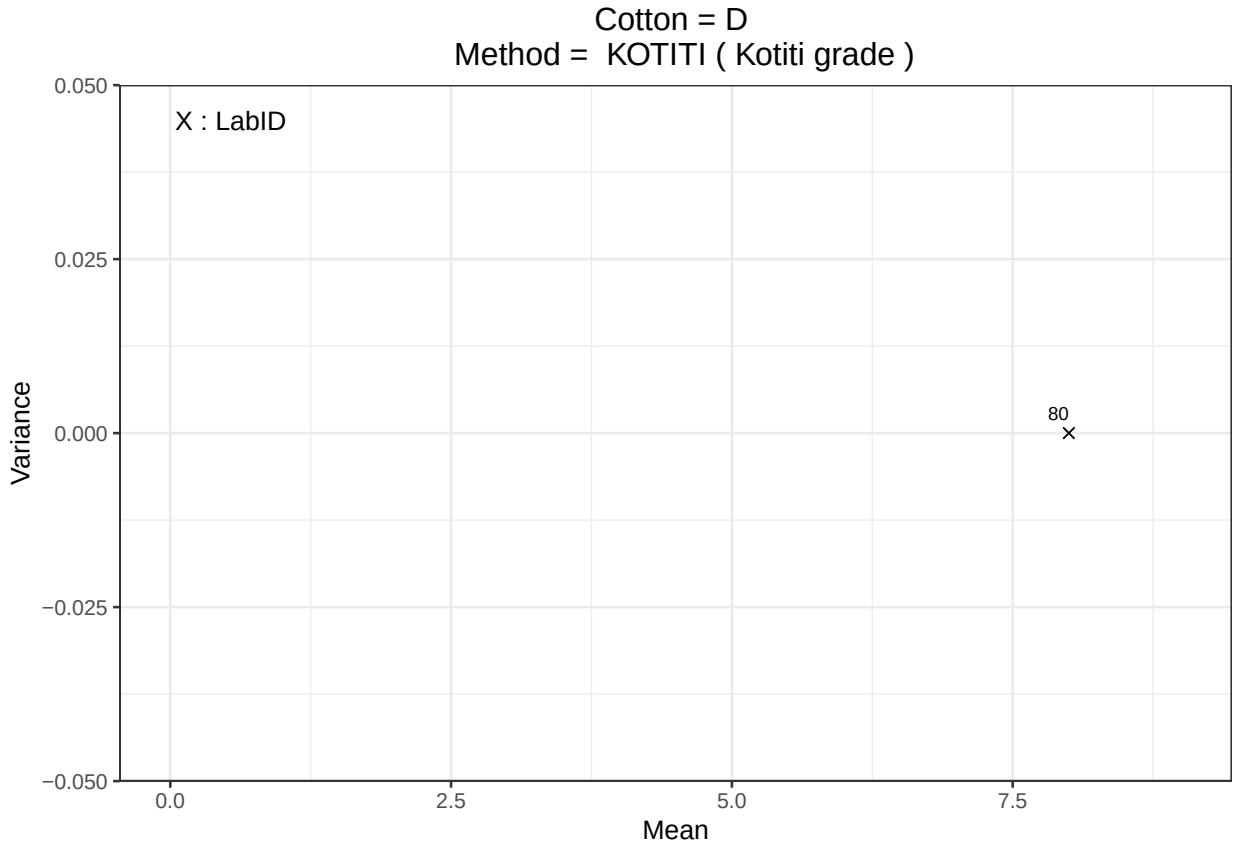

Cotton = C
Method = SCT (Sticky points)
X : LabID
20
75
115
70
140
30
110
120
15
145
40
5
100
Variance
Mean
0
100
200
300
0
50
100
150

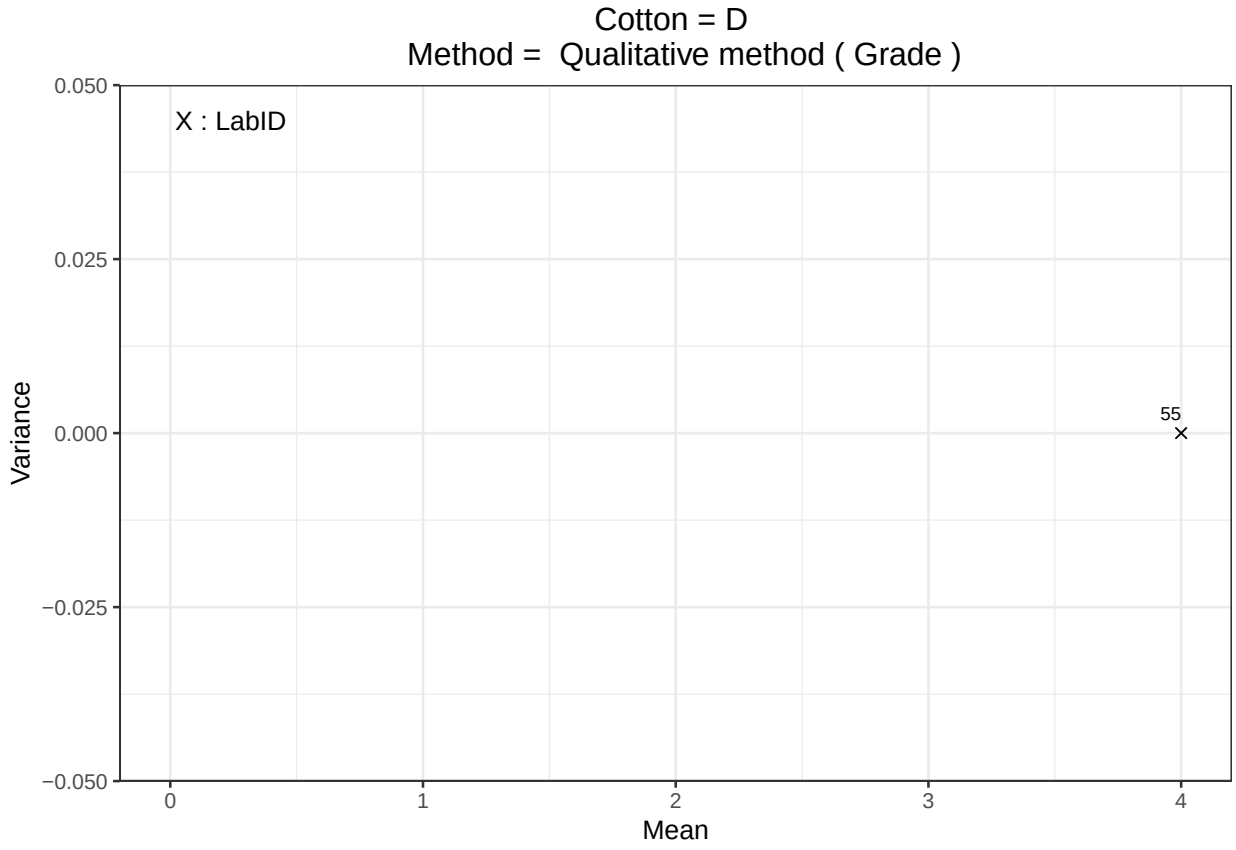
Cotton D : Variance between individual measurements = f(Mean) for all concerned labs

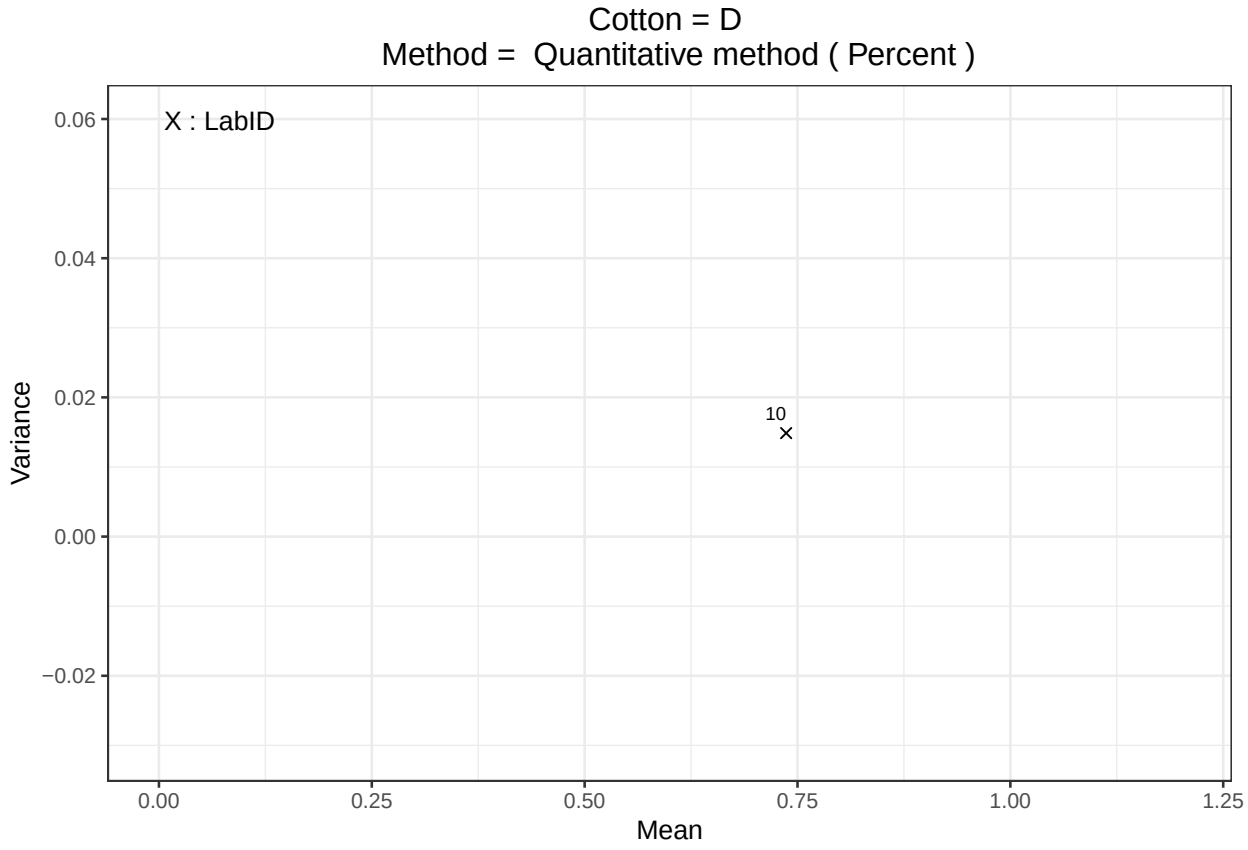


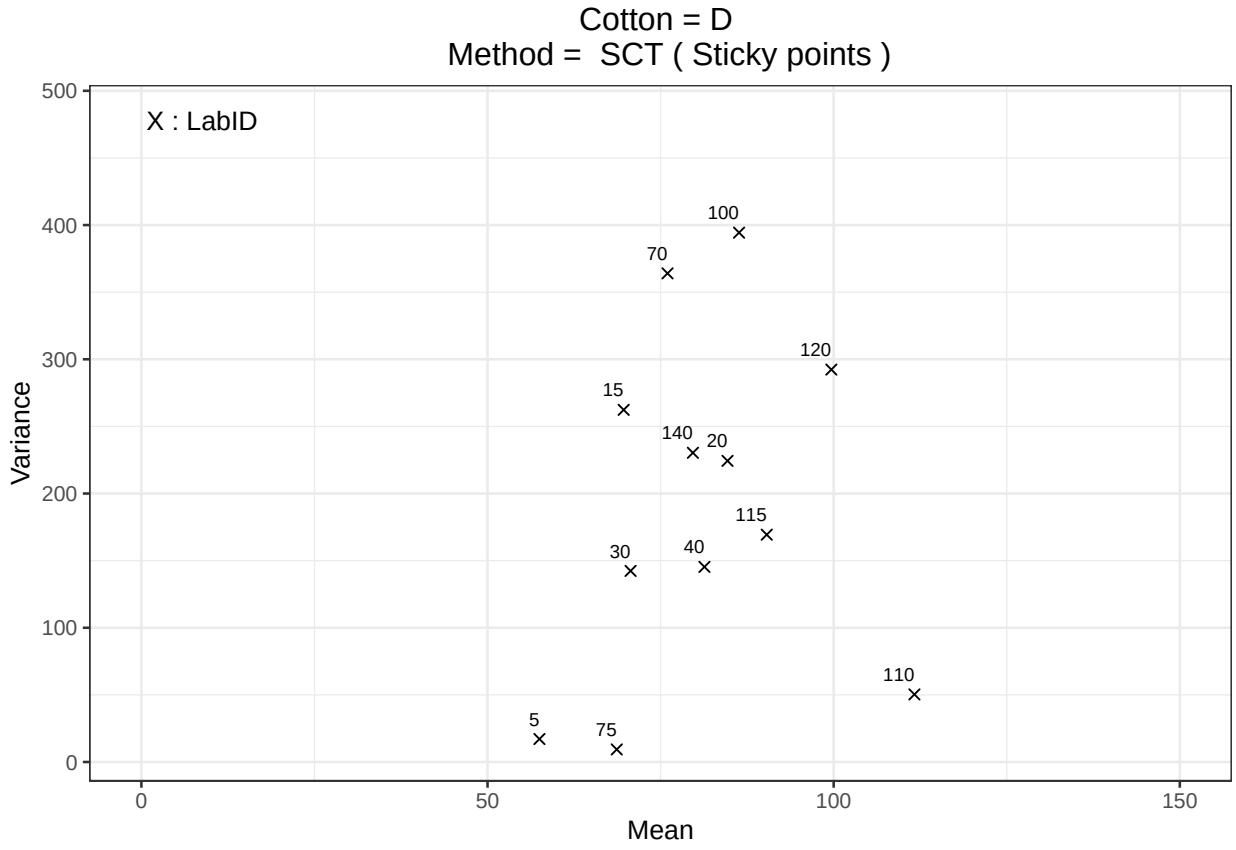

Cotton = D
Method = GB/T13785−1992 (Color degree)
X : LabID
45
Variance
0.275
0.250
0.225
0.200
0
1
2
3
4
Mean


Cotton = D
Method = H2SD (Sticky points)
X : LabID
95
165
170
175
160
135
Variance
Mean
0
30
60
90
0
20
40
60


Cotton = D
Method = KOTITI (Kotiti grade)
X : LabID
80
Variance
Mean
0.050
0.025
0.000
−0.025
−0.050
0.0
2.5
5.0
7.5


Cotton = D
Method = Qualitative method (Grade)
X : LabID
55
Variance
Mean
0.050
0.025
0.000
−0.025
−0.050
0
1
2
3
4


Cotton = D
Method = Quantitative method (Percent)
X : LabID
10
Variance
Mean
0.06
0.04
0.02
0.00
−0.02
0.00
0.25
0.50
0.75
1.00
1.25


Cotton = D
Method = SCT (Sticky points)
X : LabID
Variance
Mean
500
400
300
200
100
0
0
50
100
150
100
70
120
15
140
20
115
30
40
110
5
75

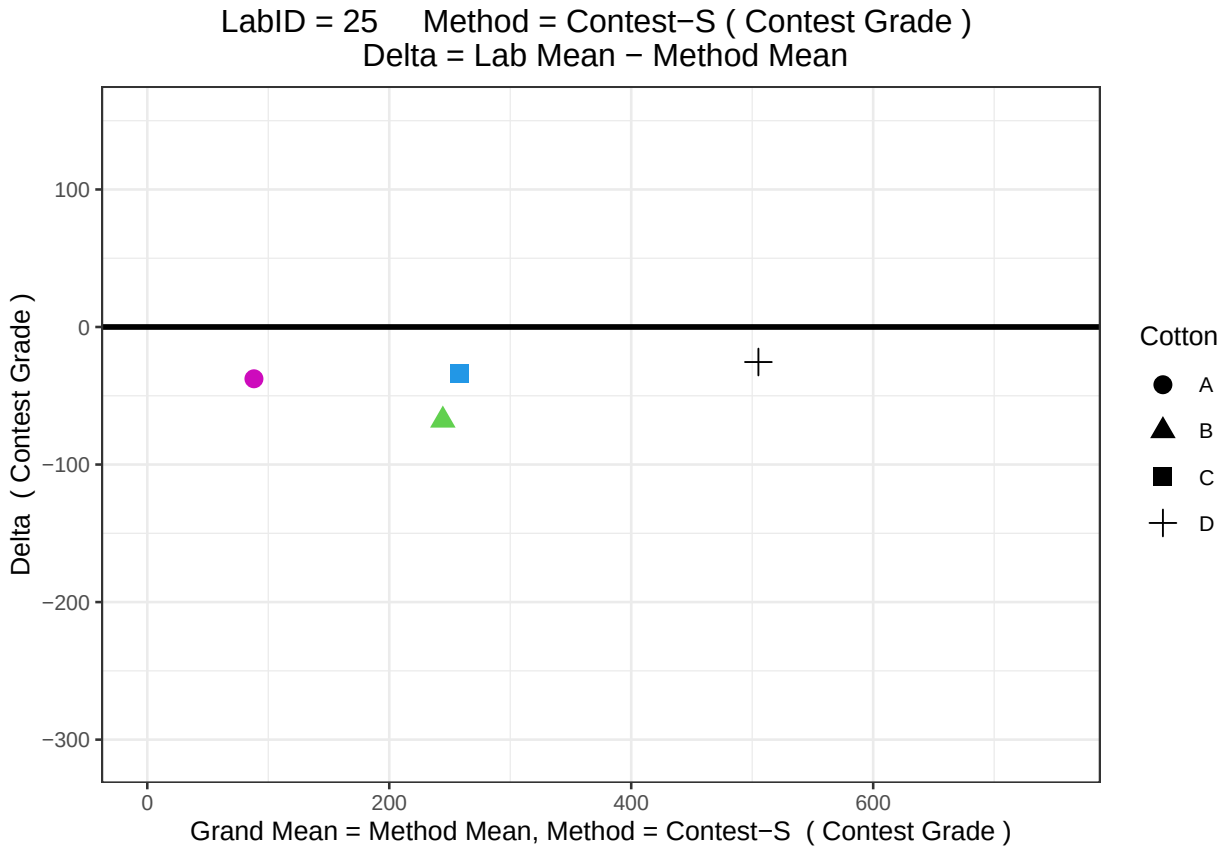
CSITC type charts: distance Delta of Lab readings to the Grand Mean by Method and by LabID [5]

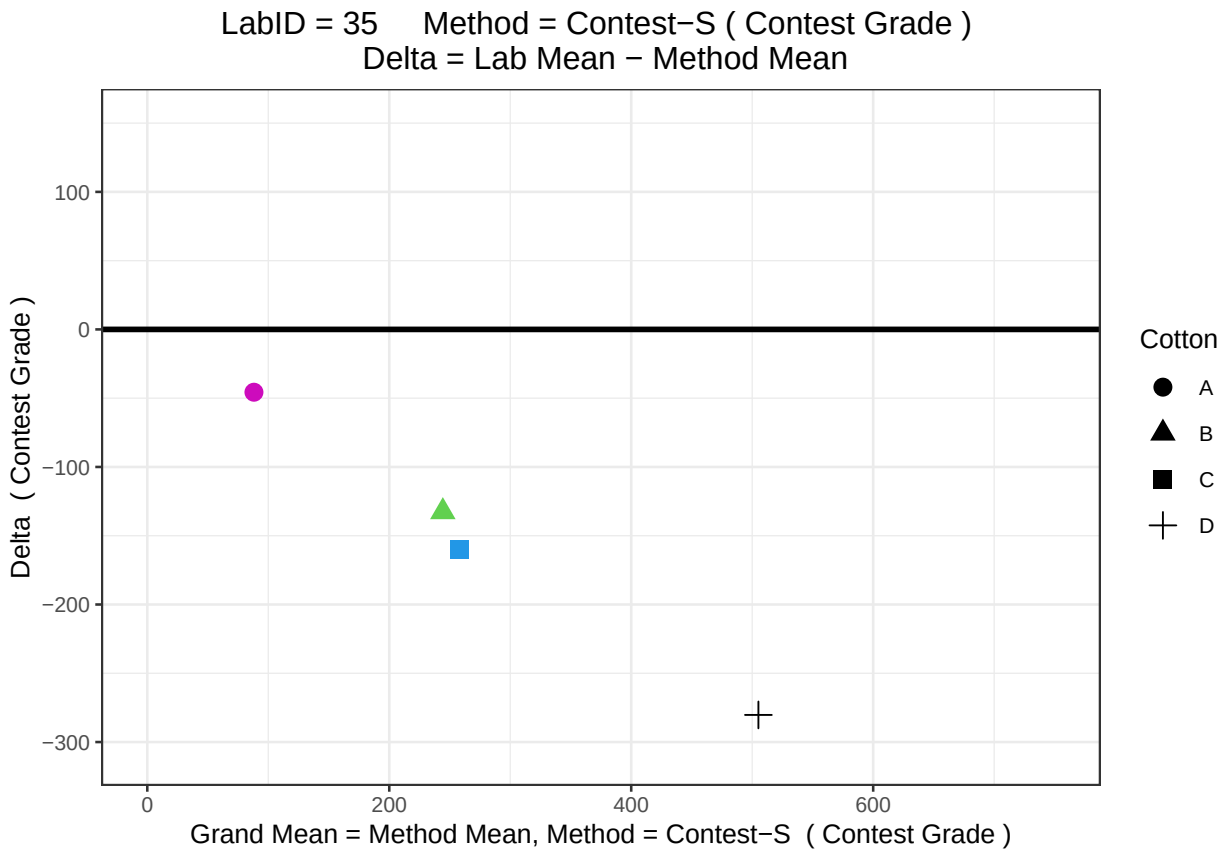
This type of chart is devoted to displaying the ability of any Method and any LabID to not deviate from the observed GrandMean of any given characteristic whatever the measured levels of the participating cottons, and then covering the range of stickiness of the participating cottons in this case. If 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 resepctive 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).

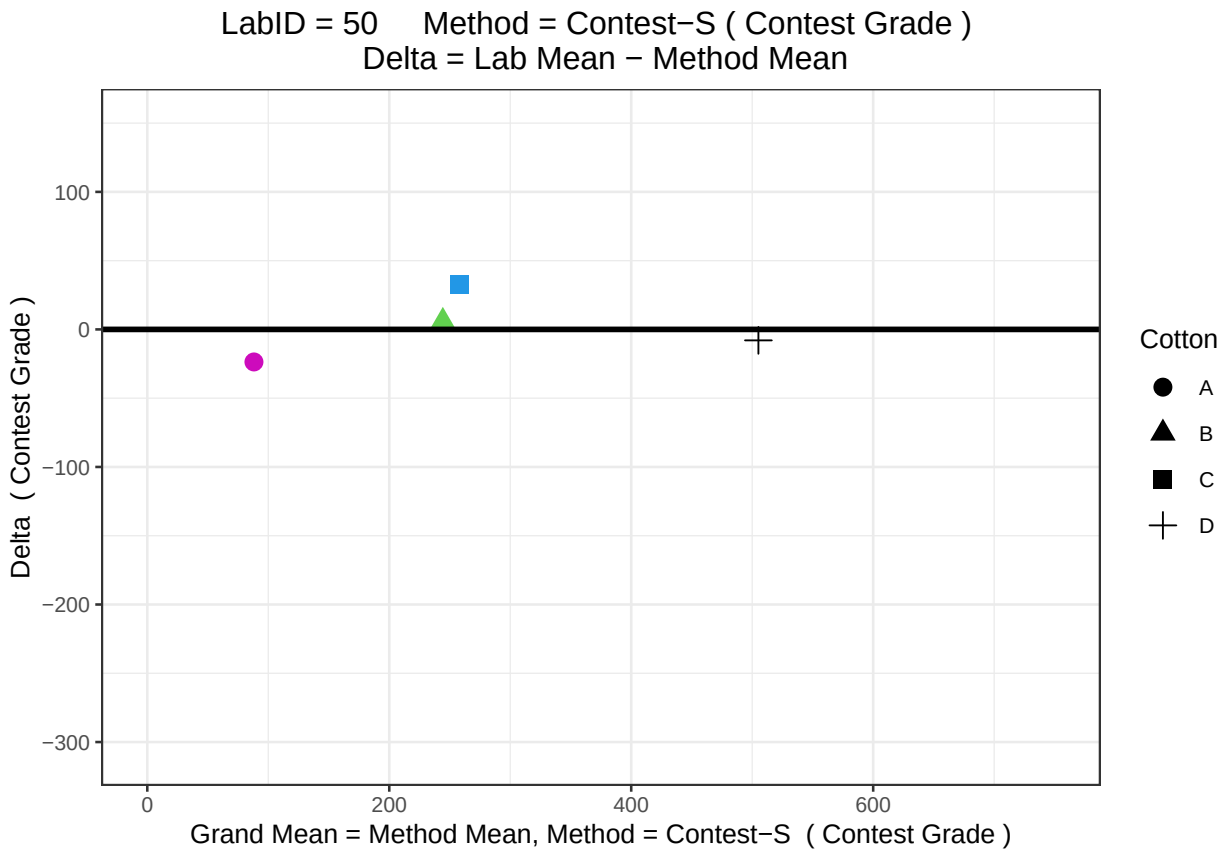
[5] Footnote

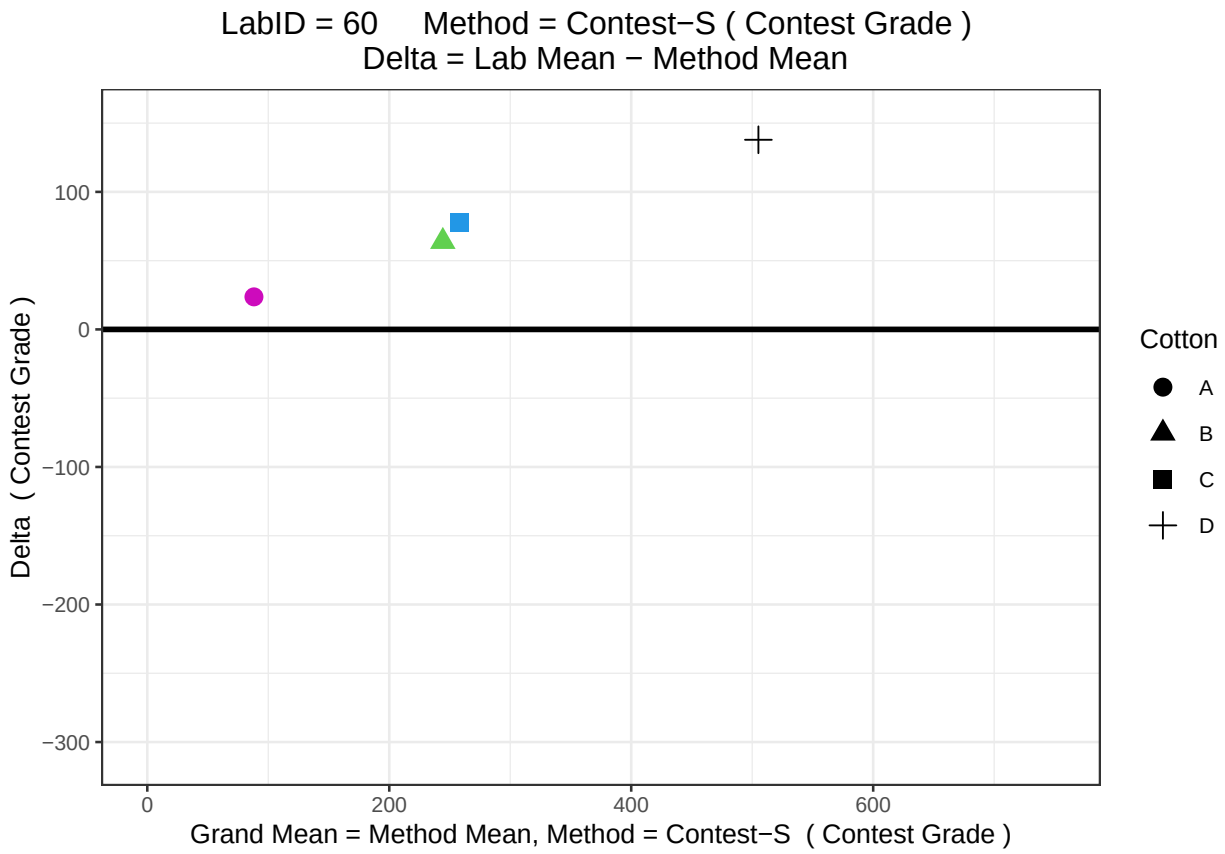
* GMean = Grand Mean of all laboratory means, calculated by Method.
* Chart abscissa axis is given in the original individual readings scale.

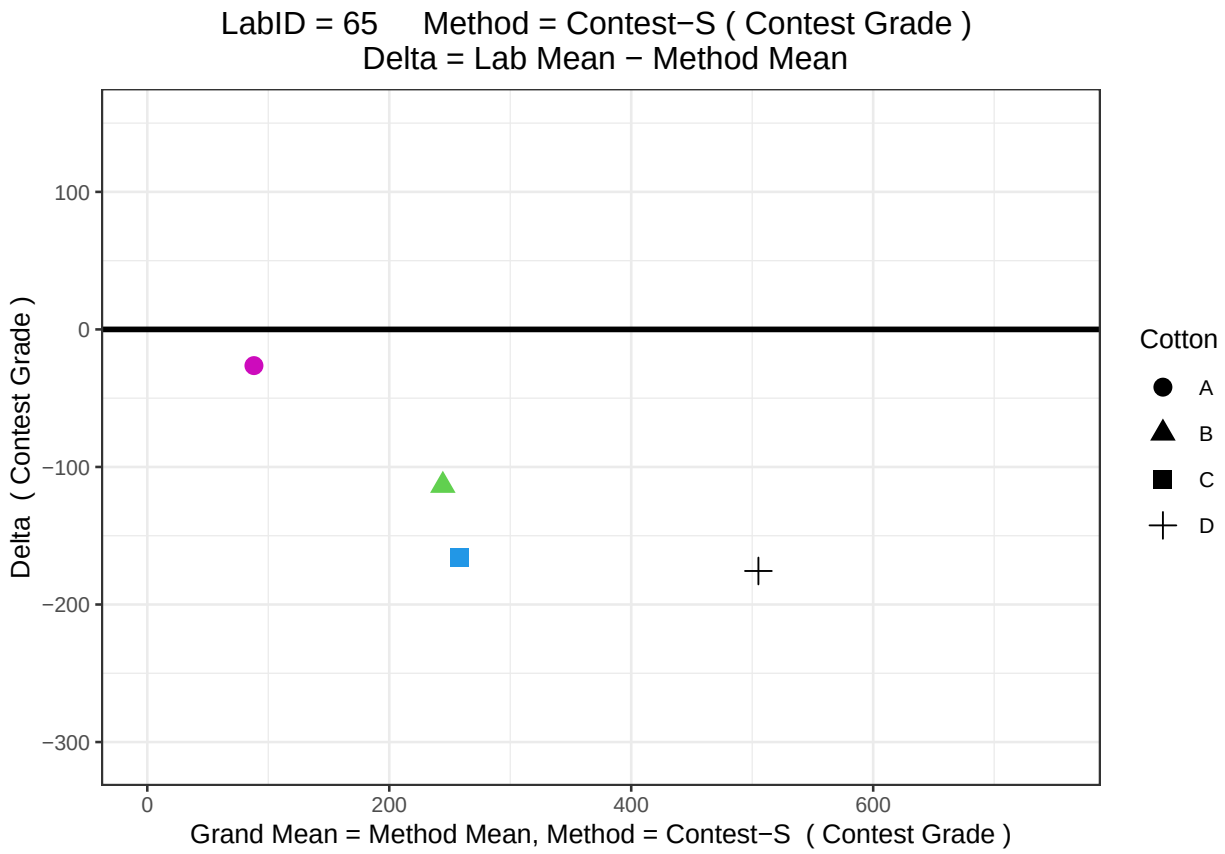
CSITC type chart for Method Contest-S

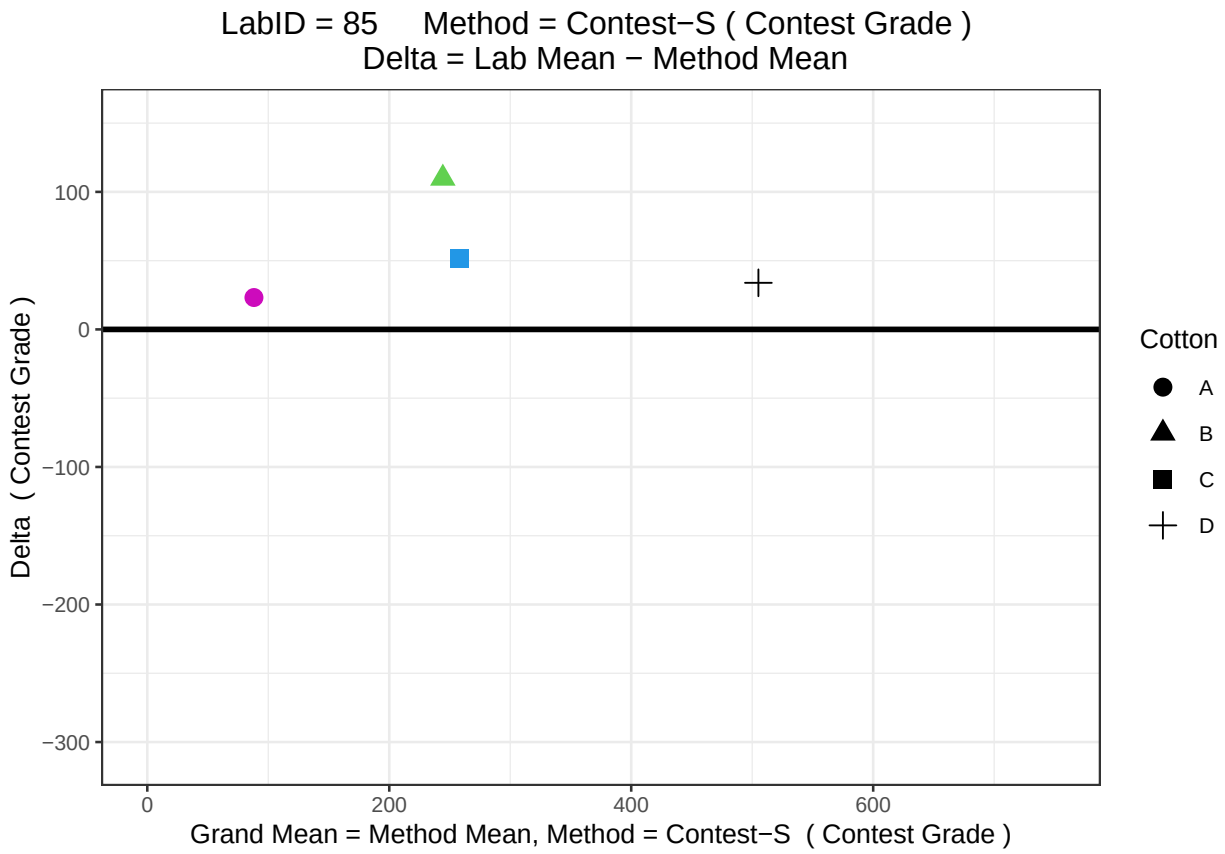


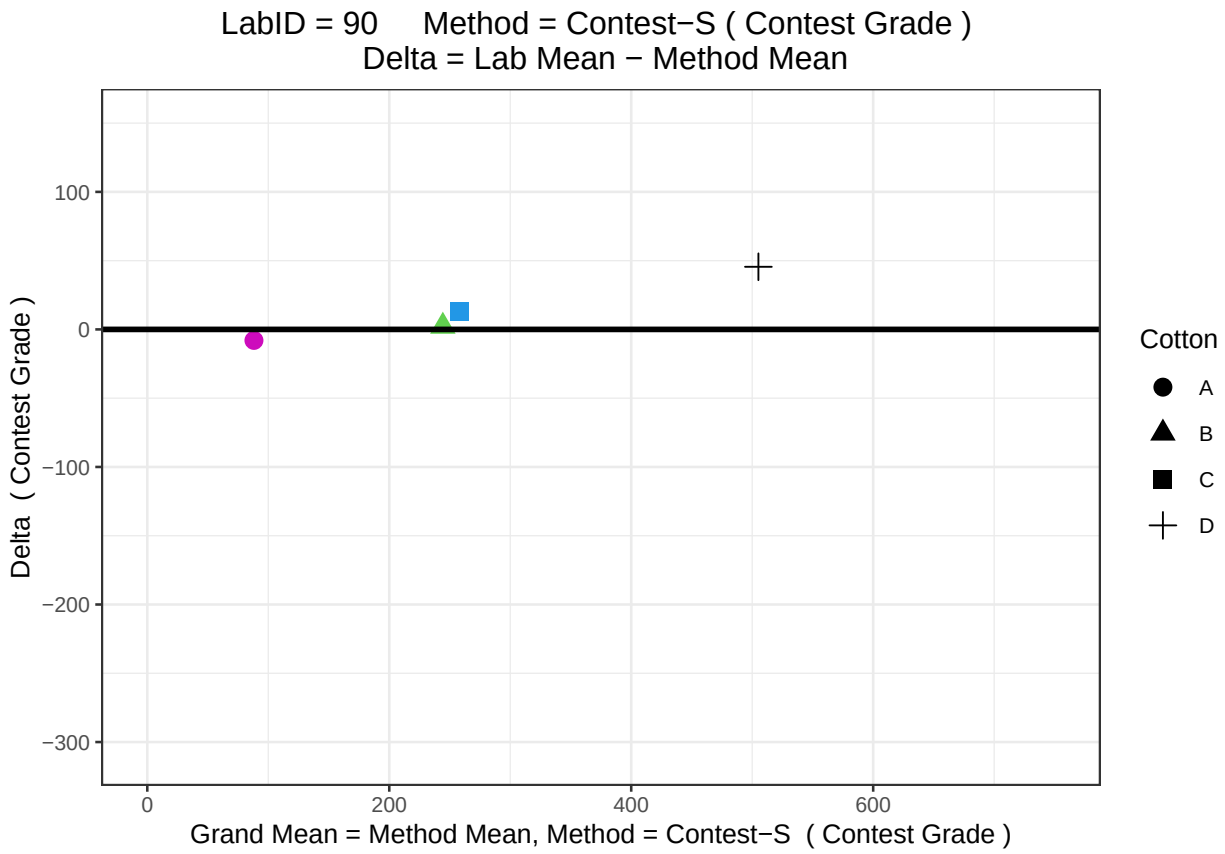

LabID = 35 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

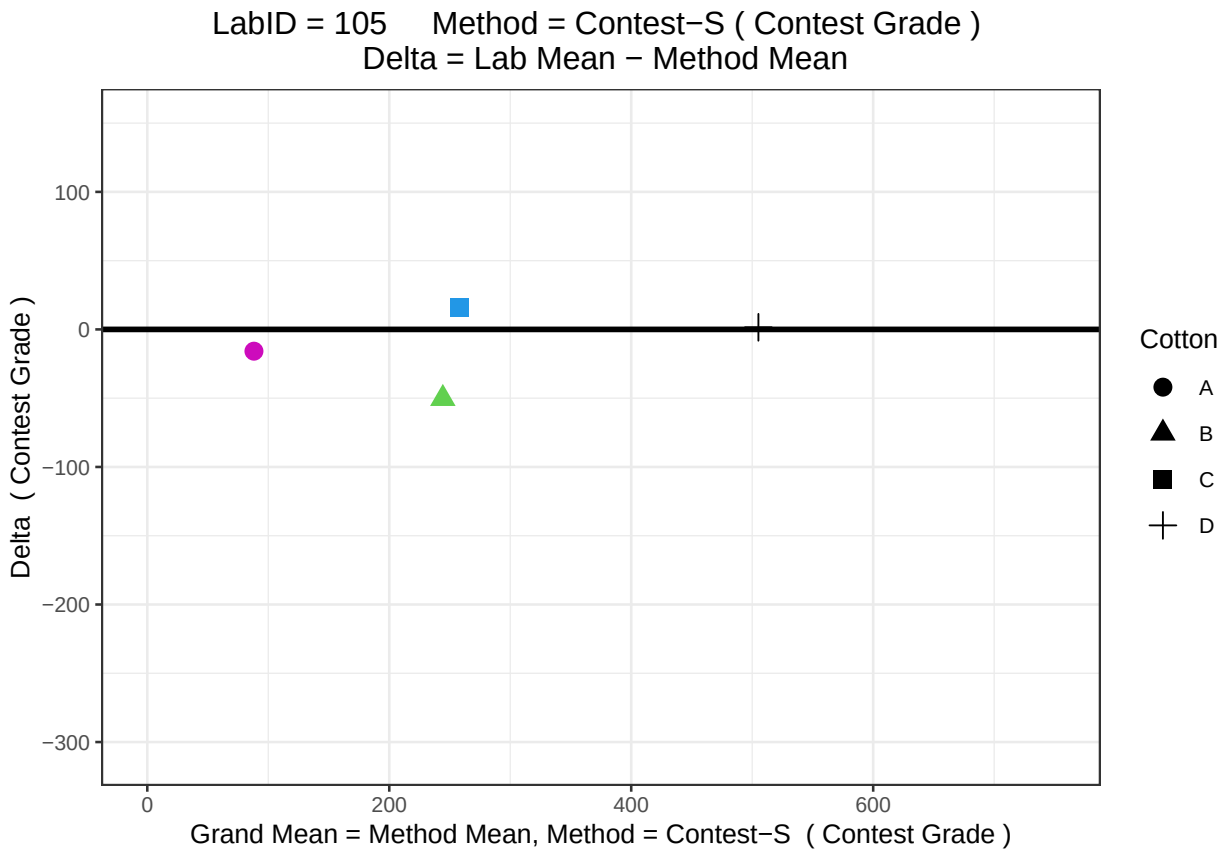

LabID = 50 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

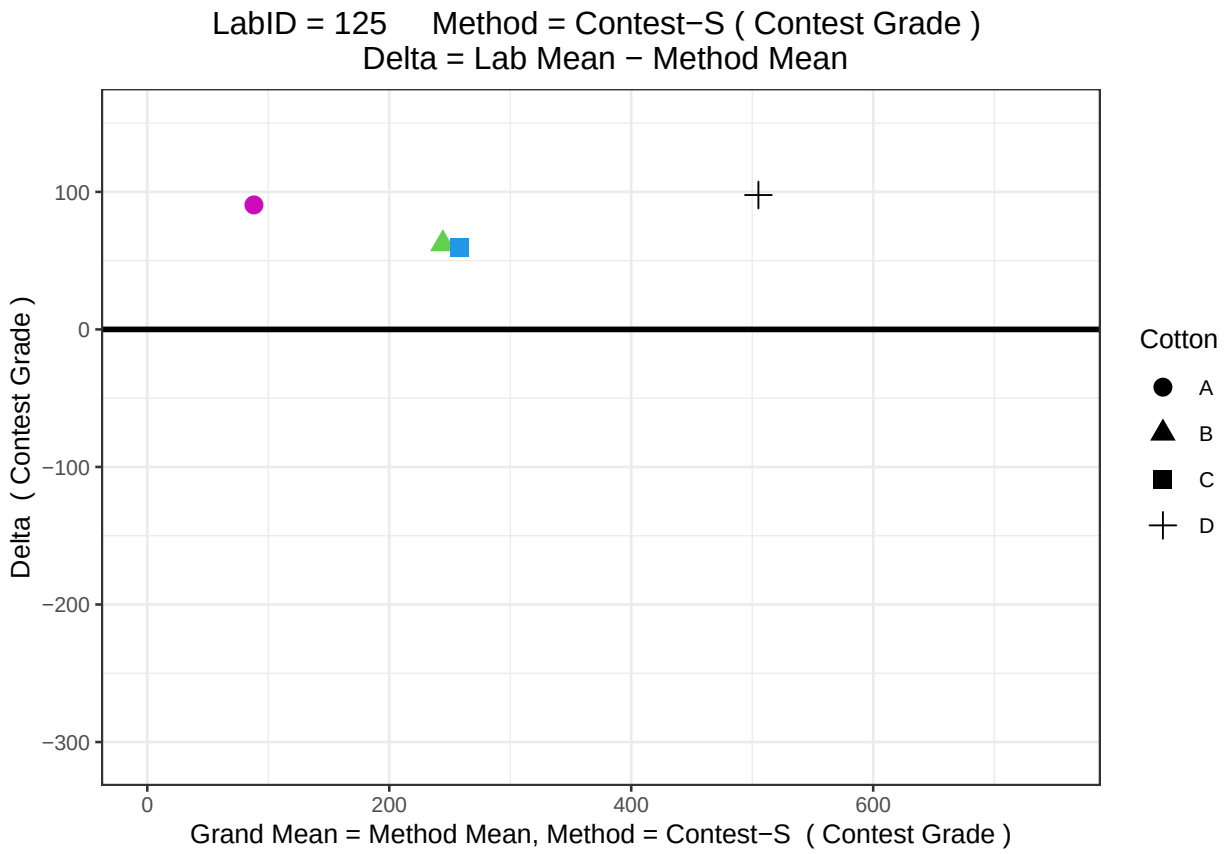

LabID = 60 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

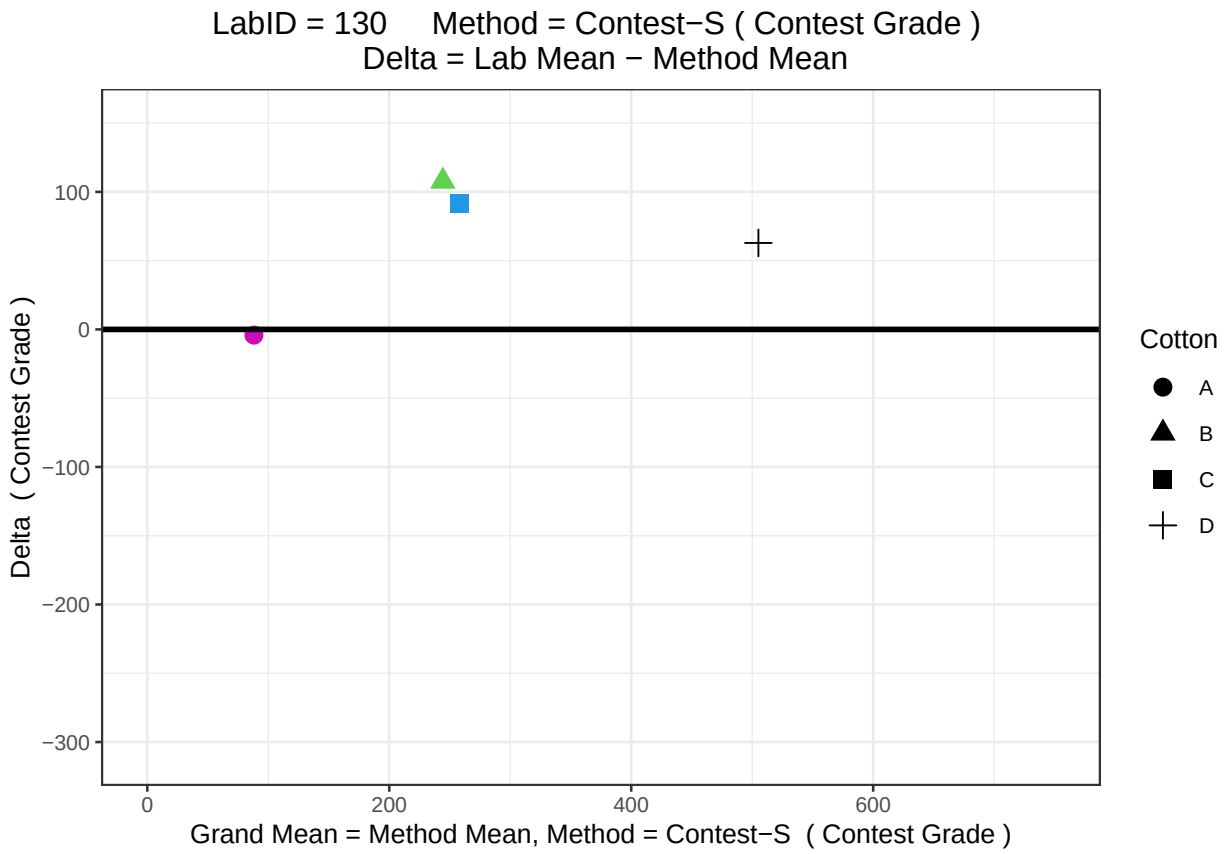

LabID = 65 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
100
0
−100
−200
−300
Delta (Contest Grade)
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

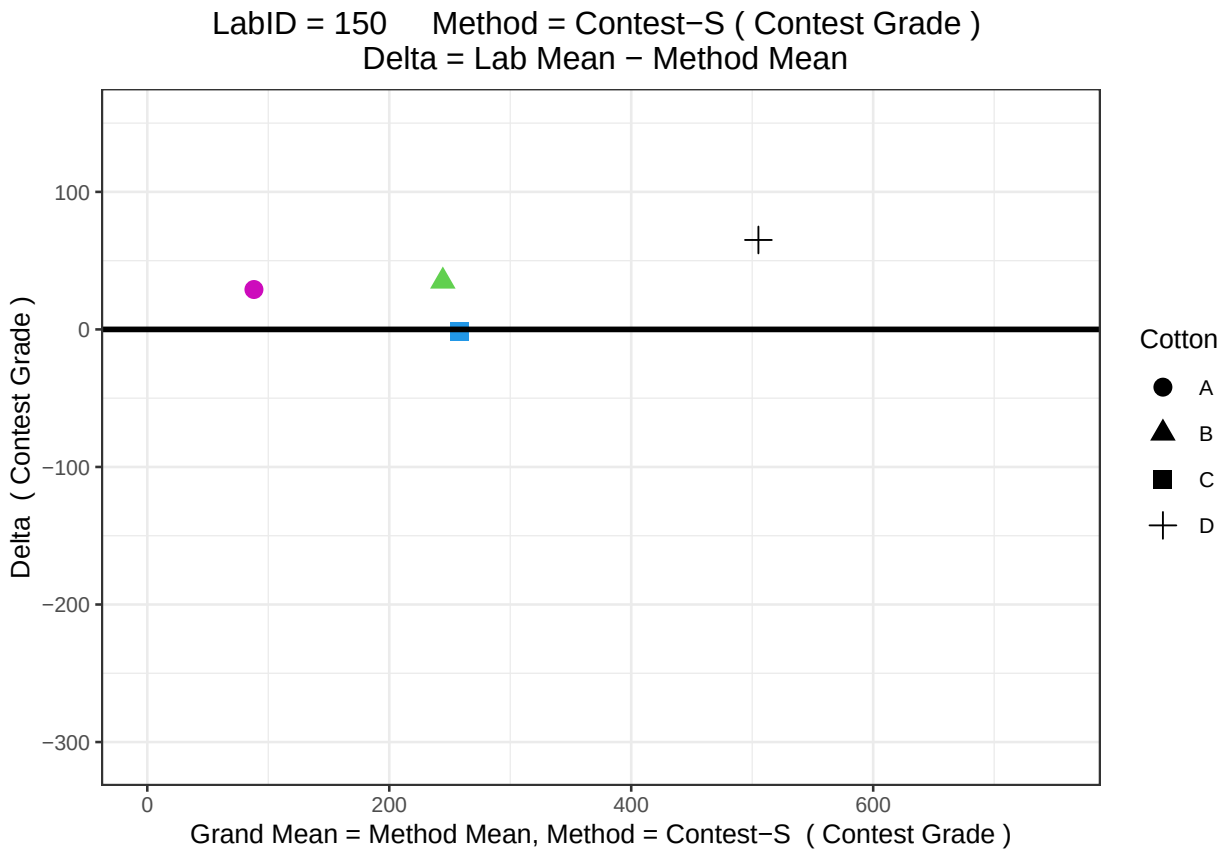

LabID = 85 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

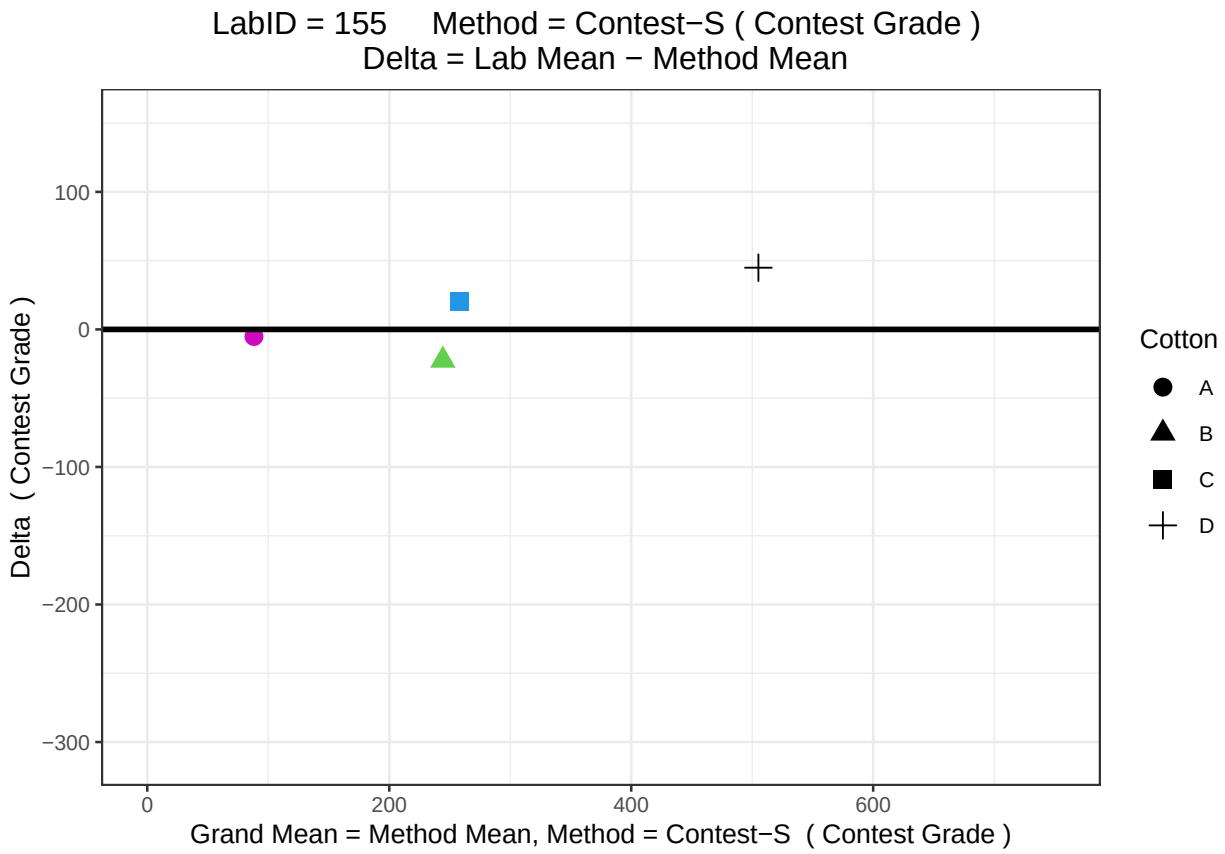

LabID = 90 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D


LabID = 105 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

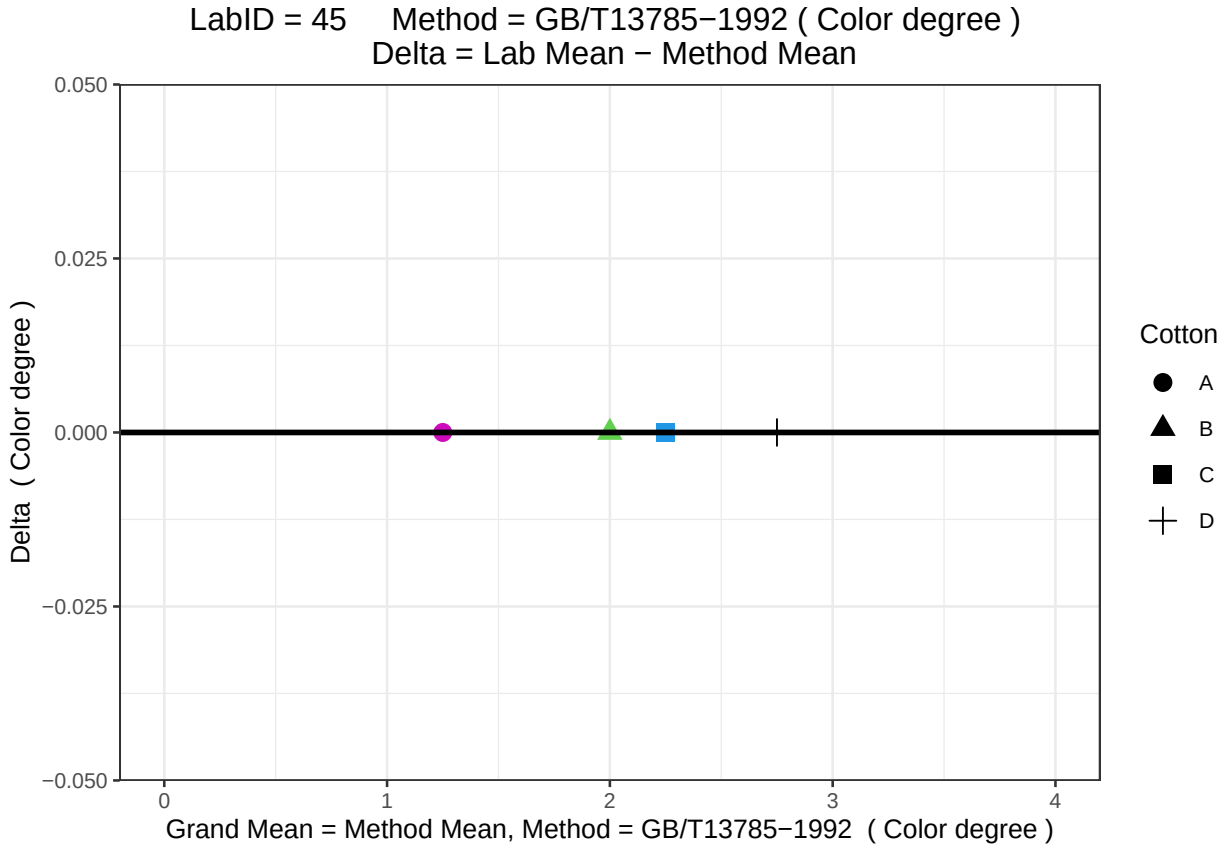

LabID = 125 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D


LabID = 130 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

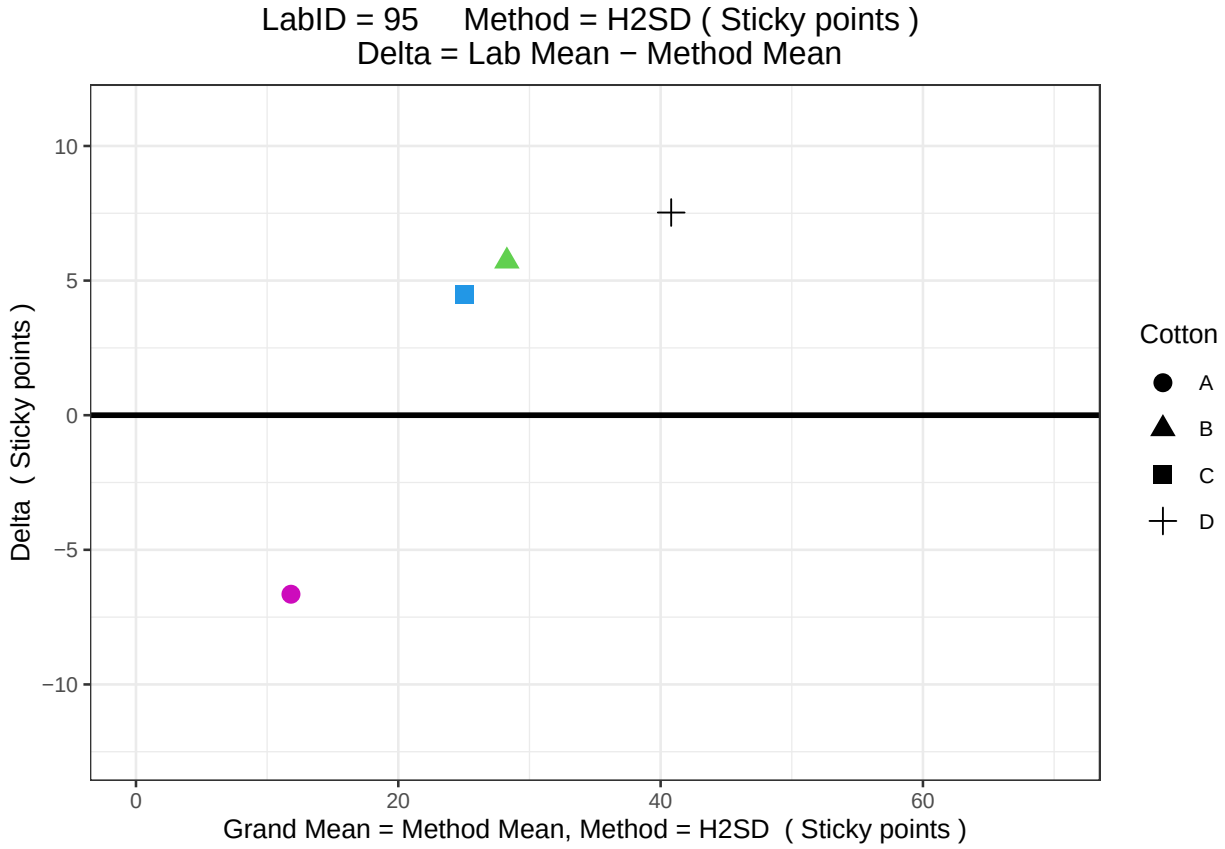

LabID = 150 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

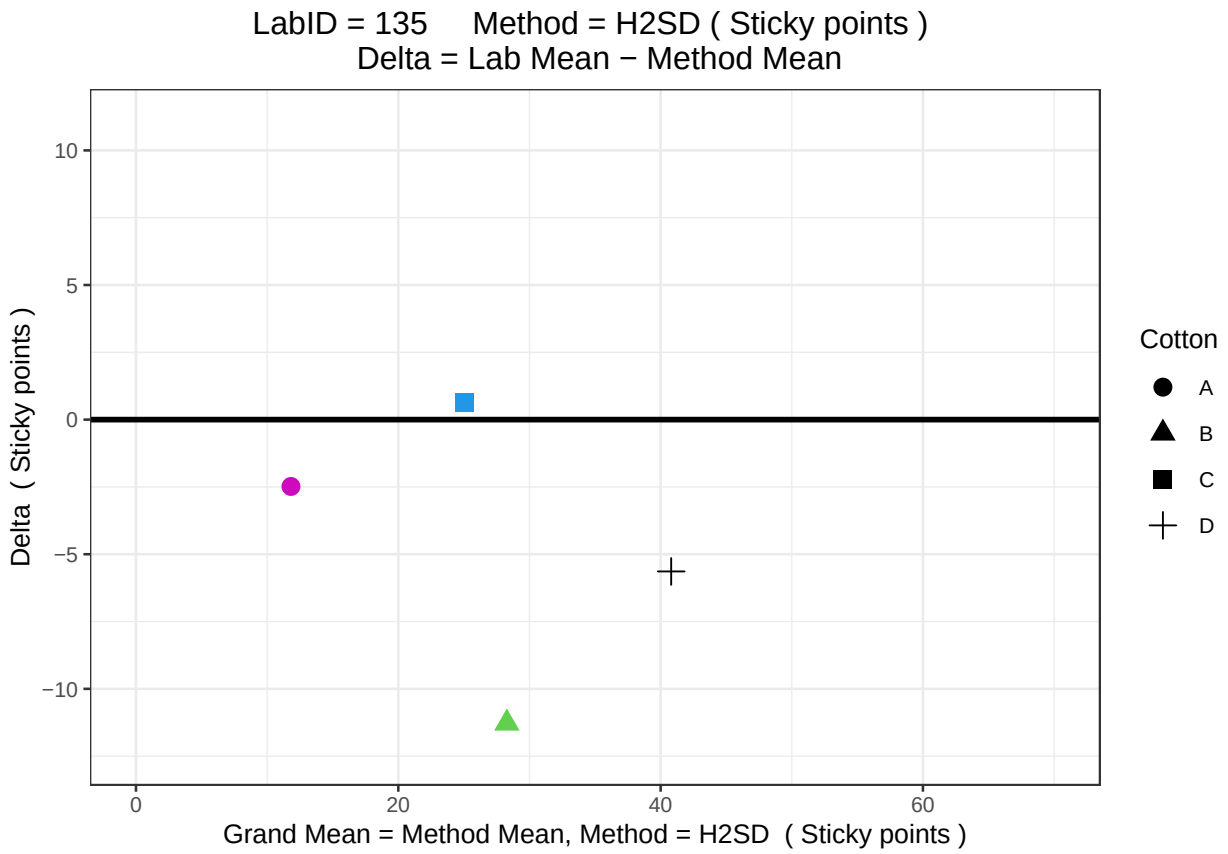

LabID = 155 Method = Contest−S (Contest Grade)
Delta = Lab Mean − Method Mean
Delta (Contest Grade)
100
0
−100
−200
−300
0
200
400
600
Grand Mean = Method Mean, Method = Contest−S (Contest Grade)
Cotton
A
B
C
D

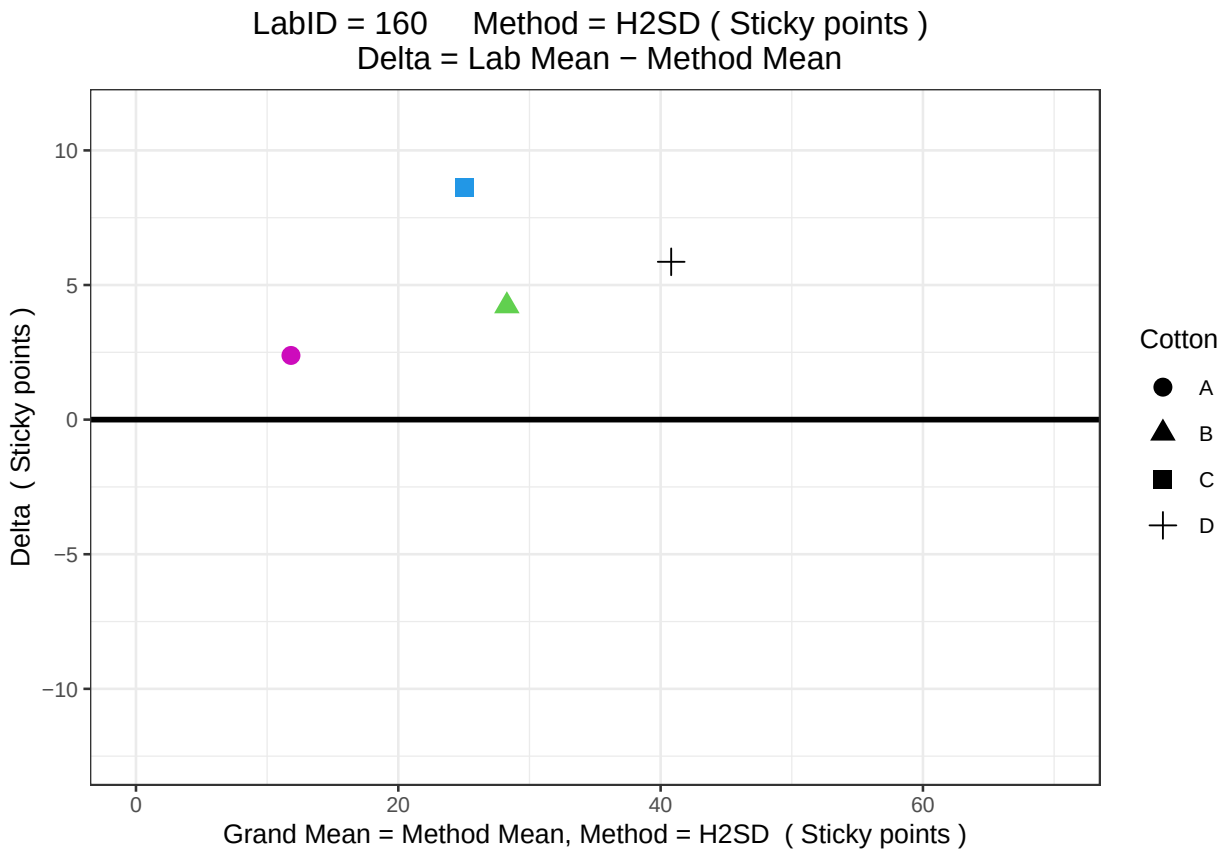
CSITC type chart for Method GB/T13785-1992

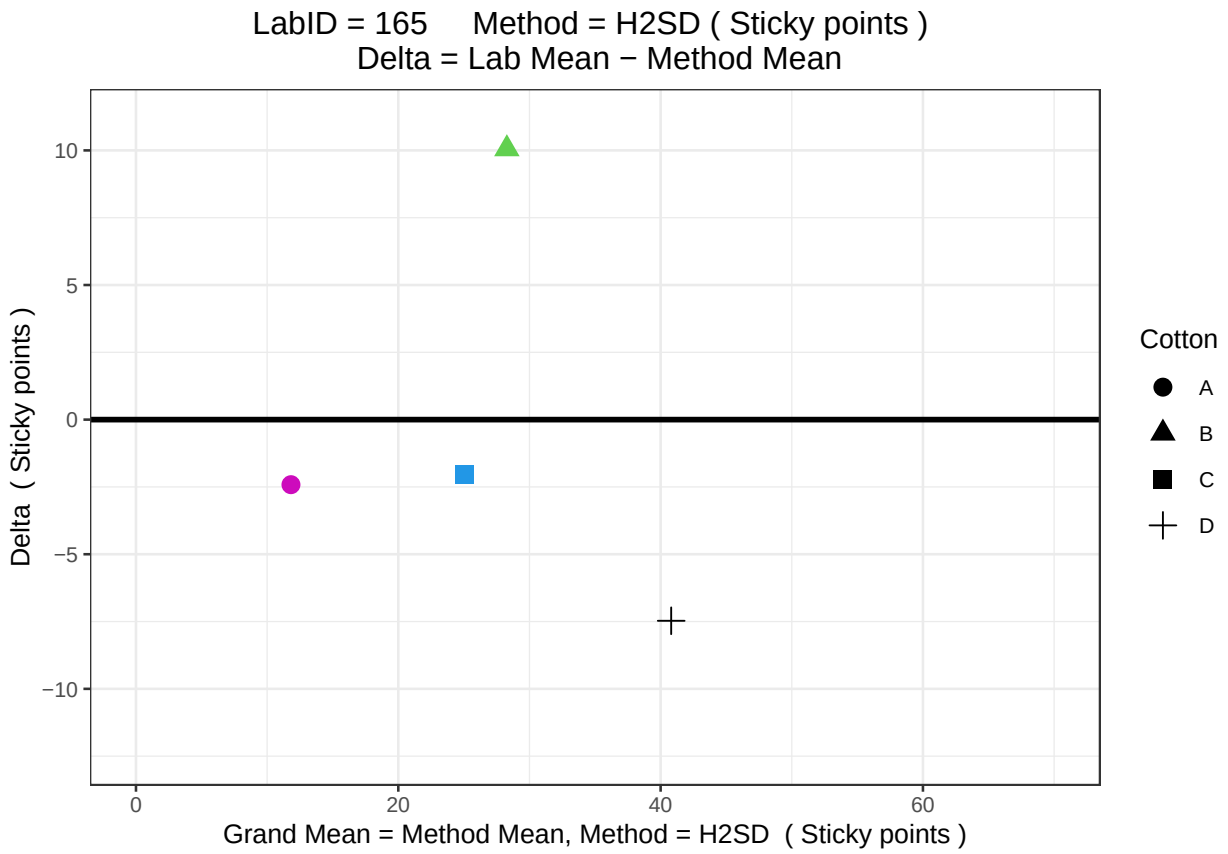


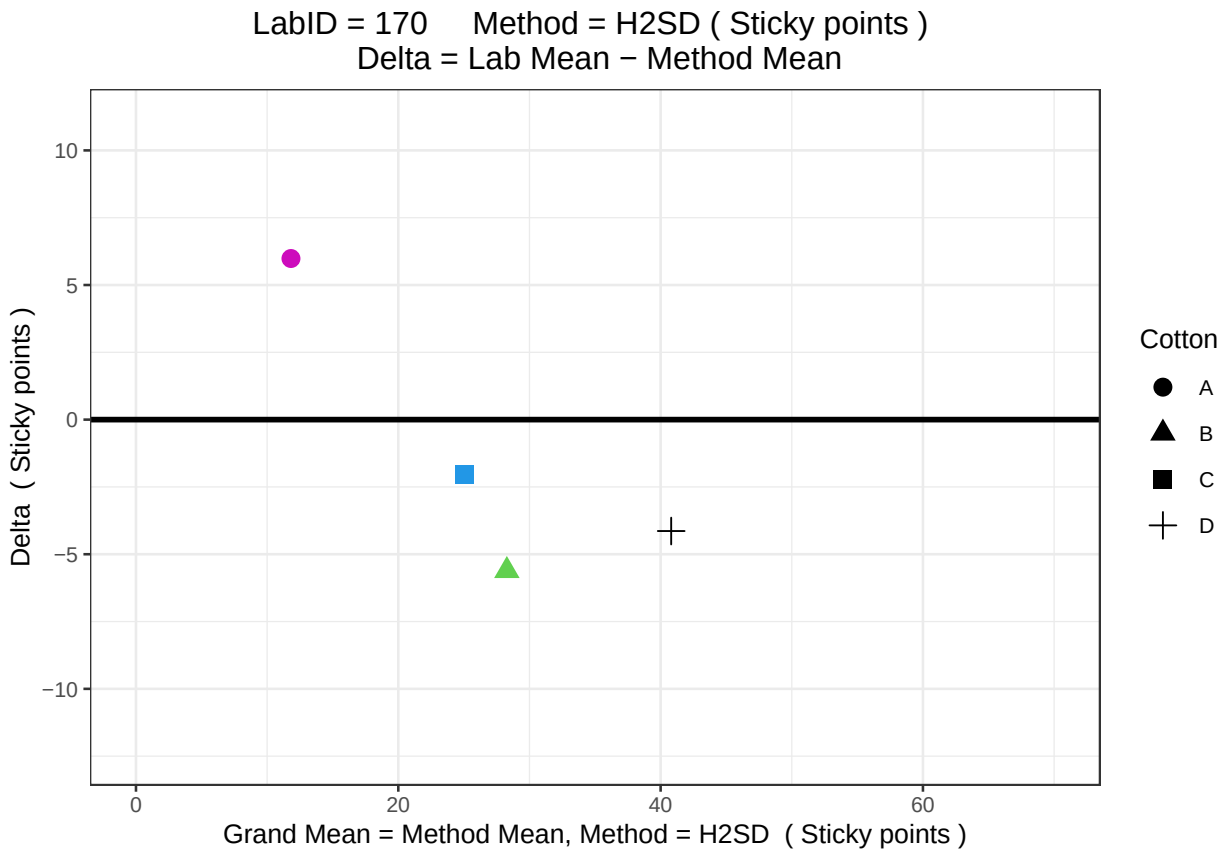
CSITC type chart for Method H2SD

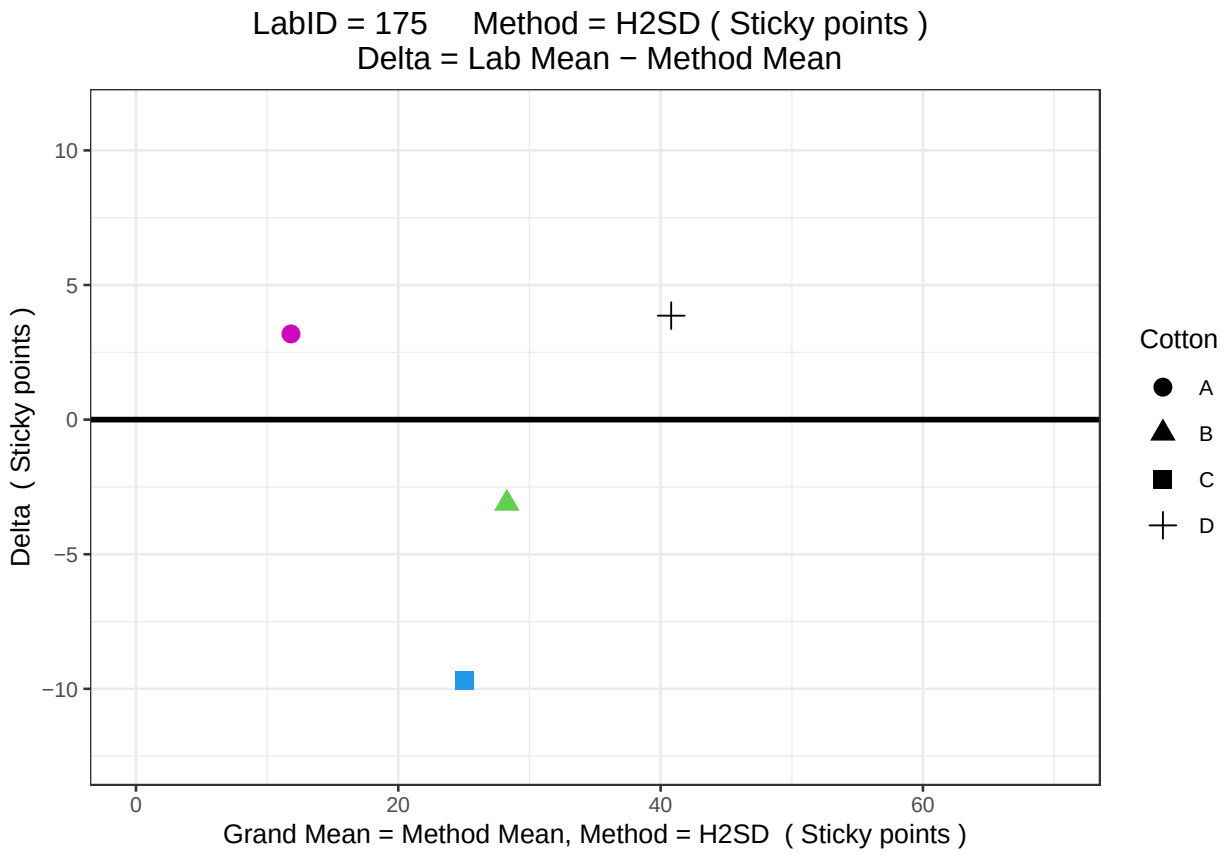



LabID = 135 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
10
5
0
−5
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D

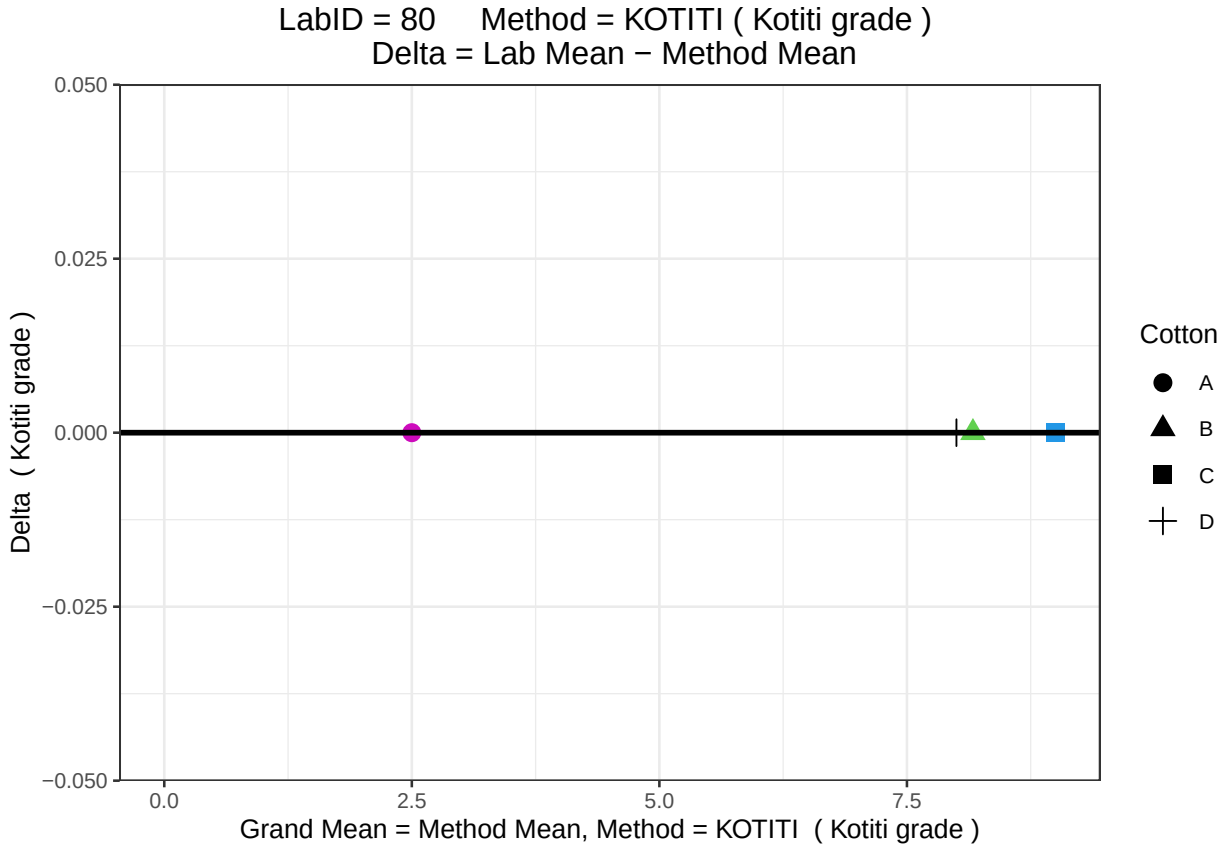

LabID = 160 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
10
5
0
−5
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D


LabID = 165 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
10
5
0
−5
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D

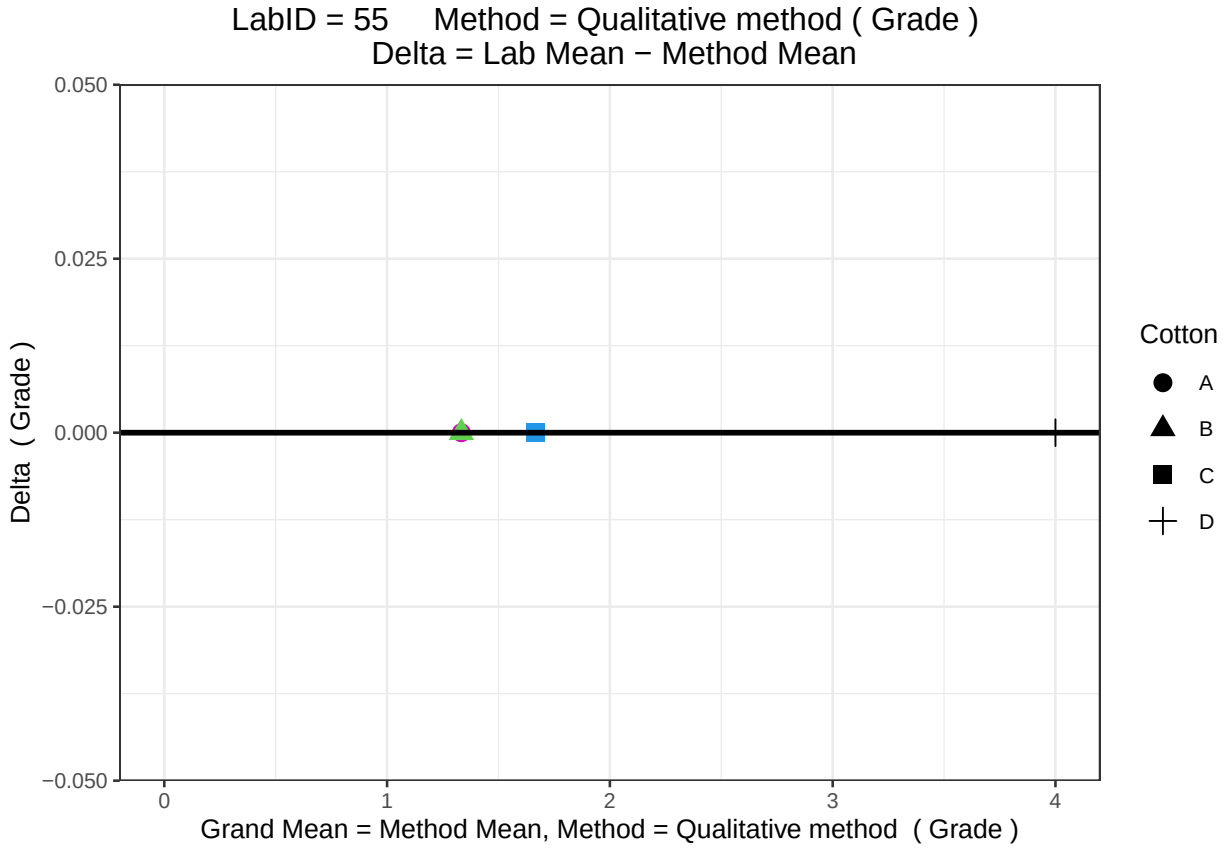

LabID = 170 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
10
5
0
−5
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D


LabID = 175 Method = H2SD (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
10
5
0
−5
−10
0
20
40
60
Grand Mean = Method Mean, Method = H2SD (Sticky points)
Cotton
A
B
C
D

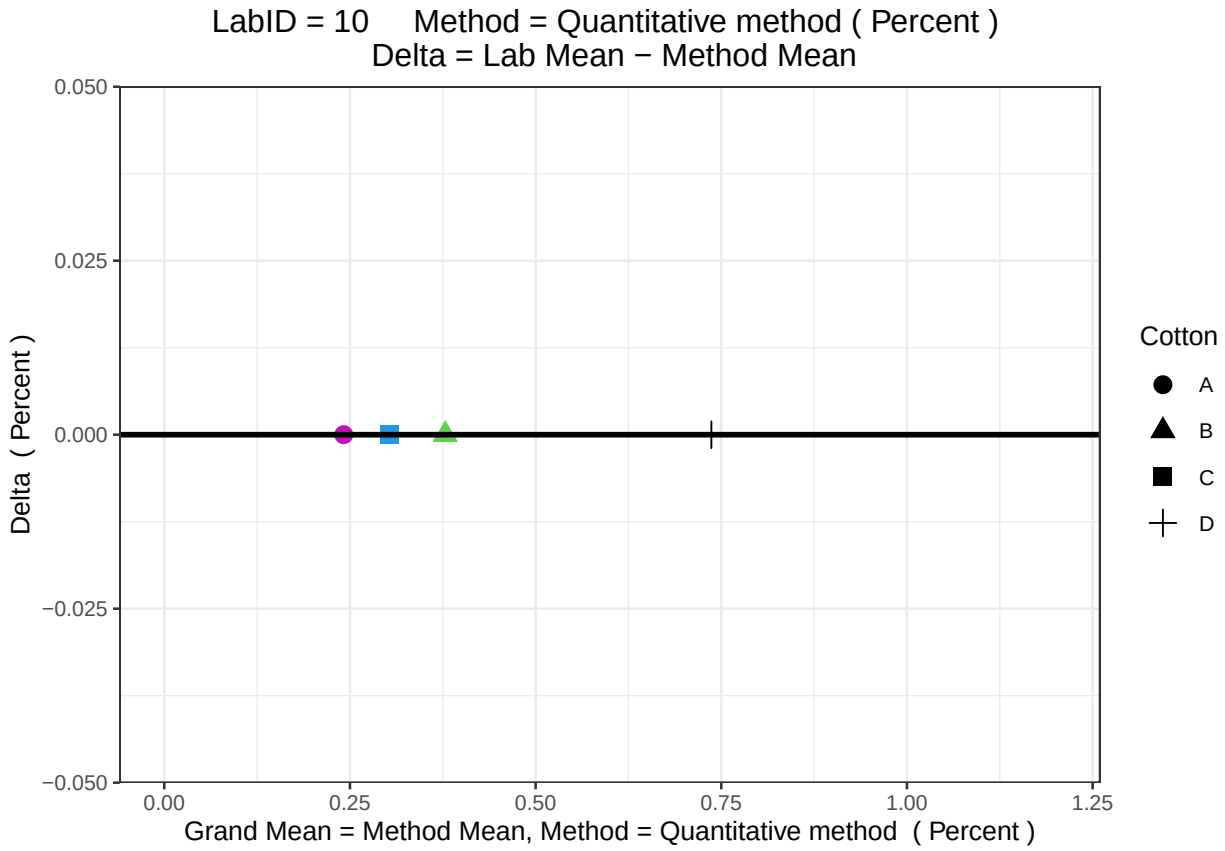
CSITC type chart for Method KOTITI



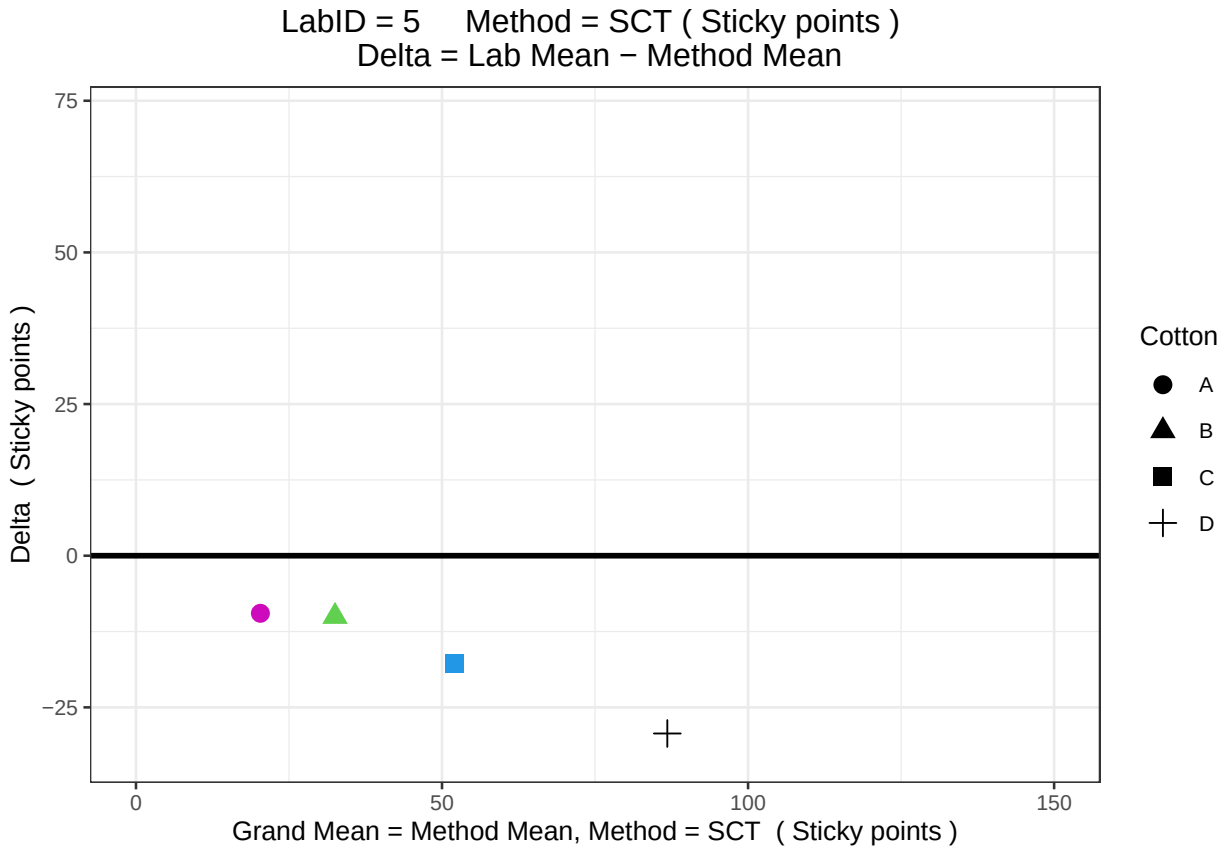
CSITC type chart for Method Qualitative method

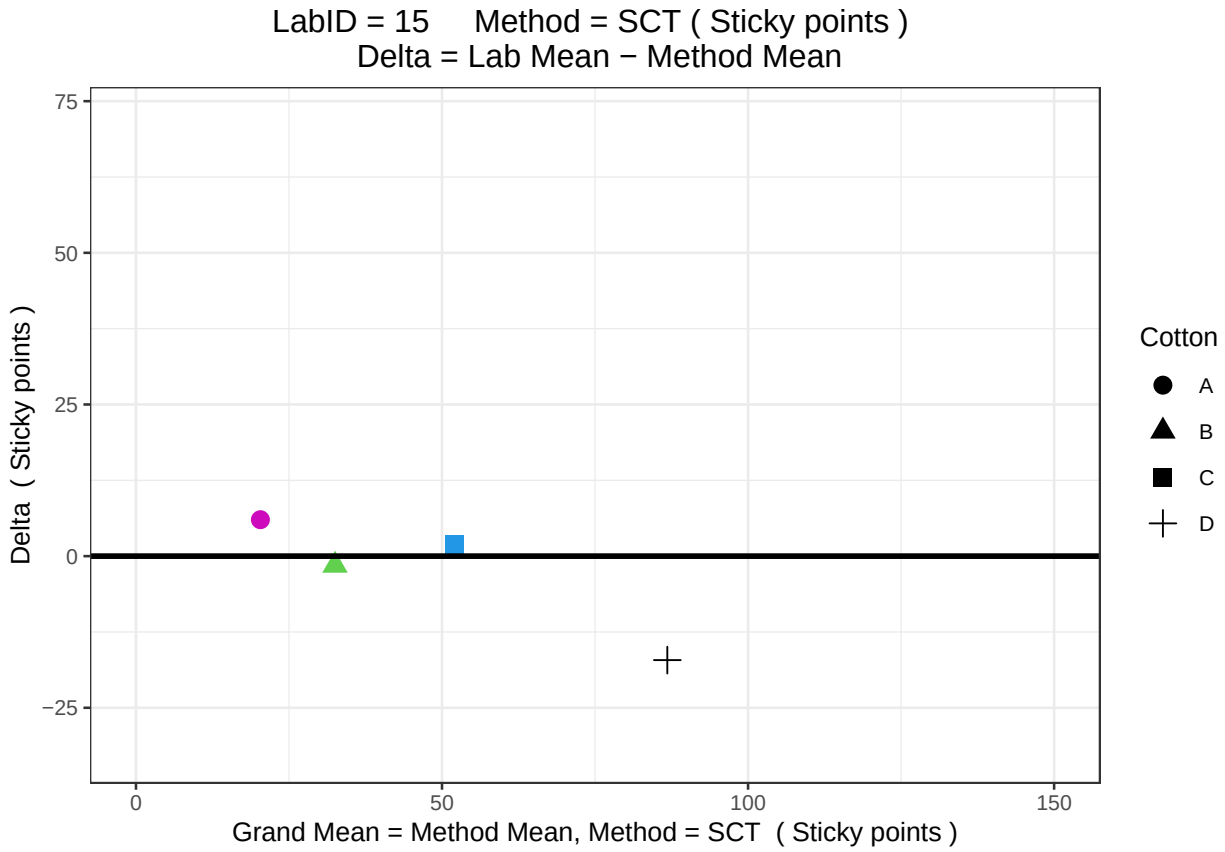


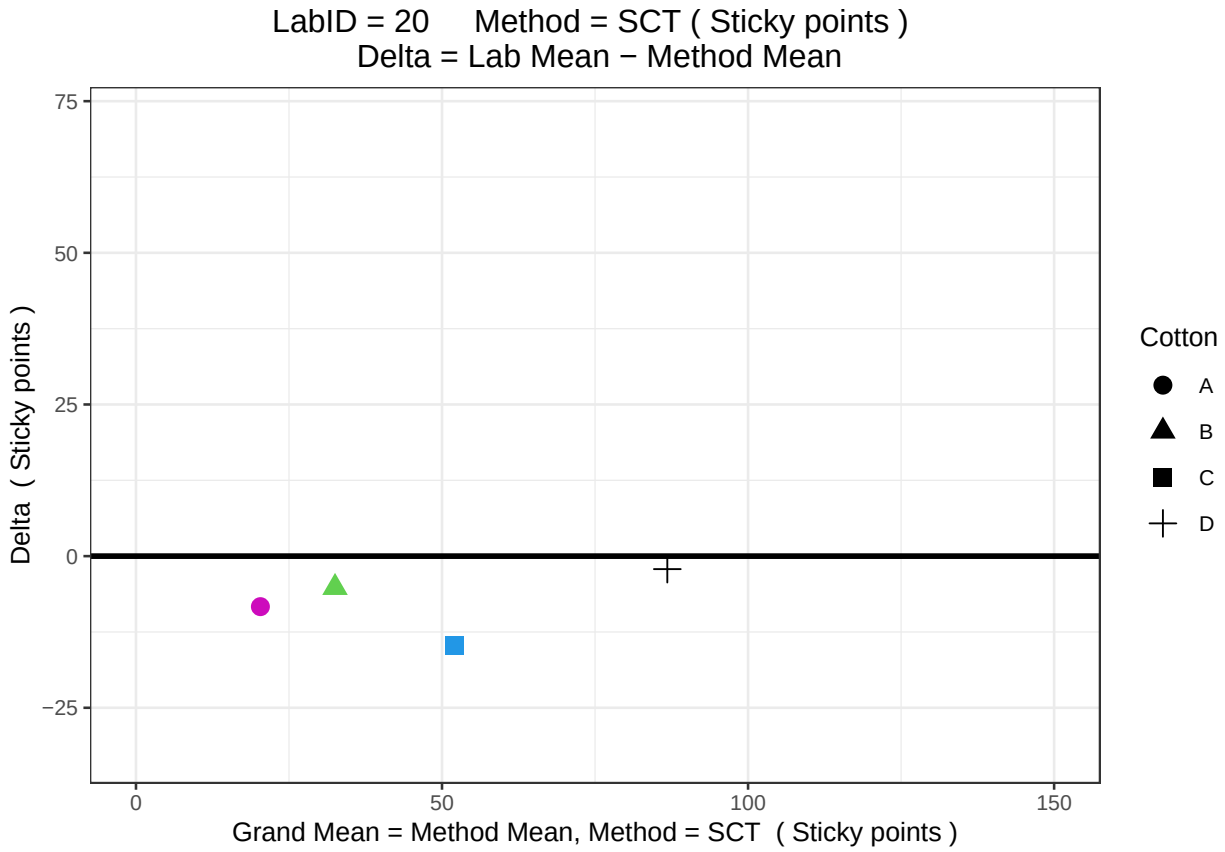
CSITC type chart for Method Quantitative method

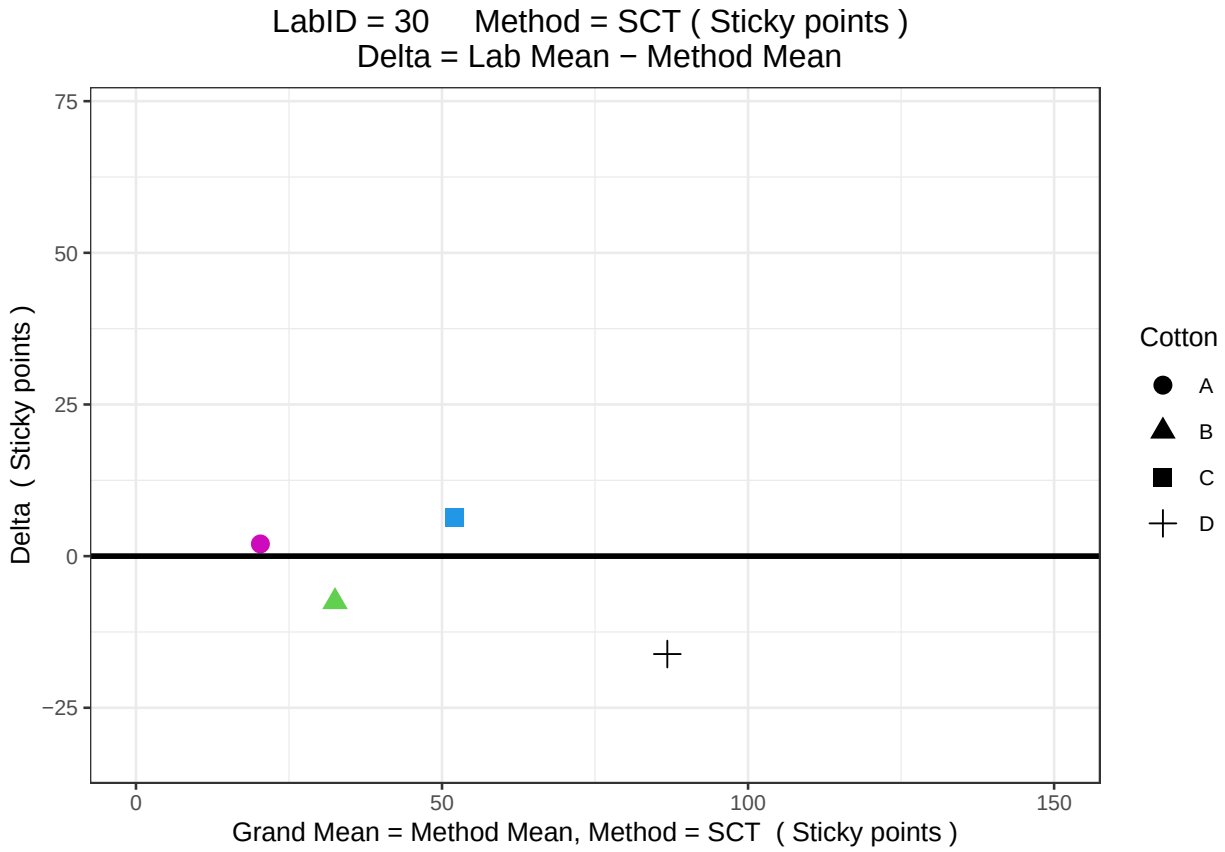


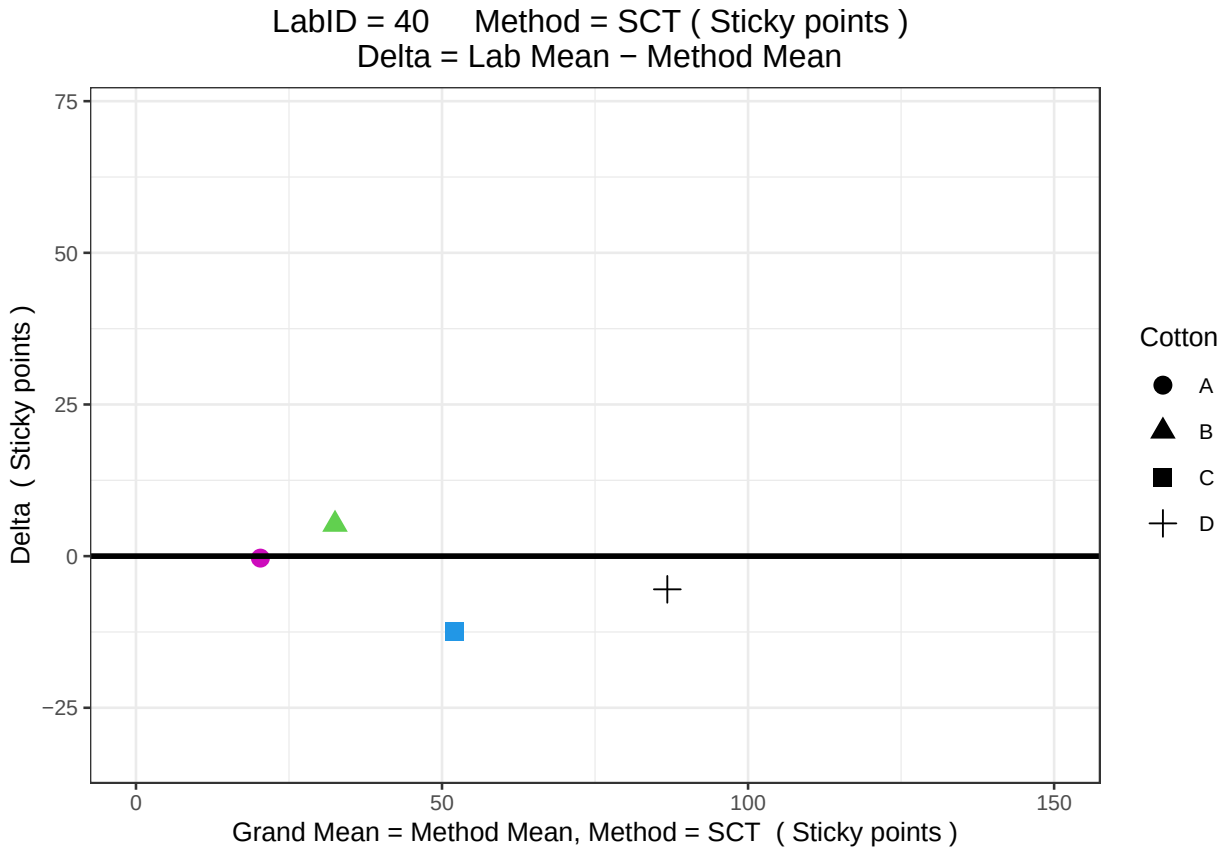
CSITC type chart for Method SCT

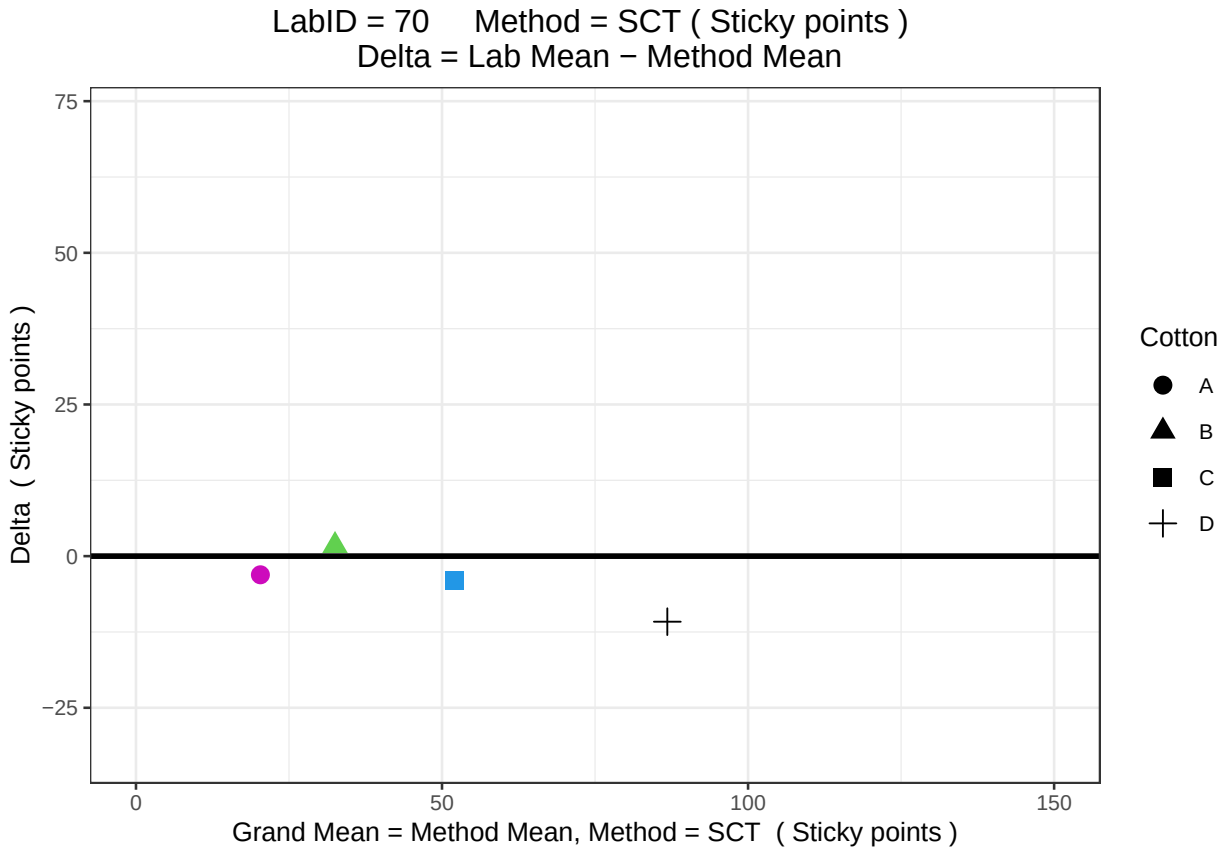


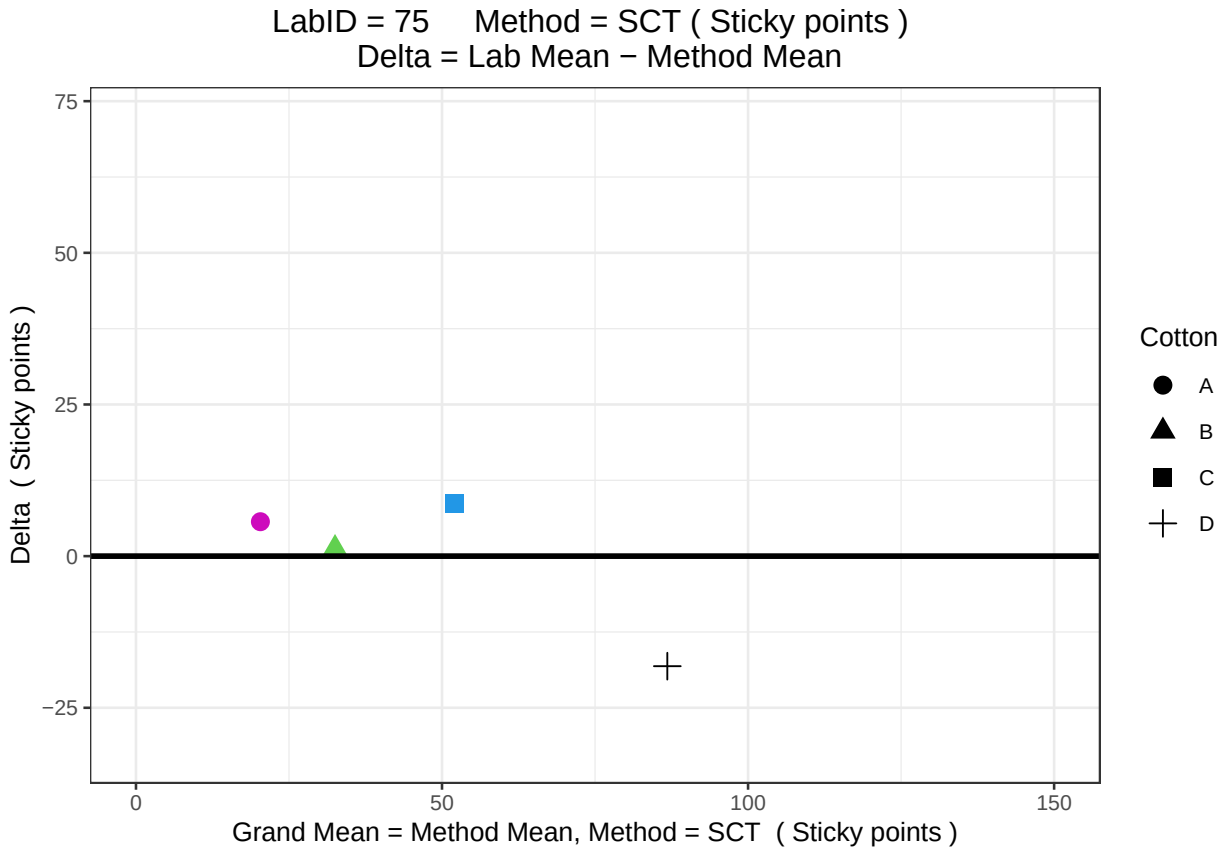

LabID = 15 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

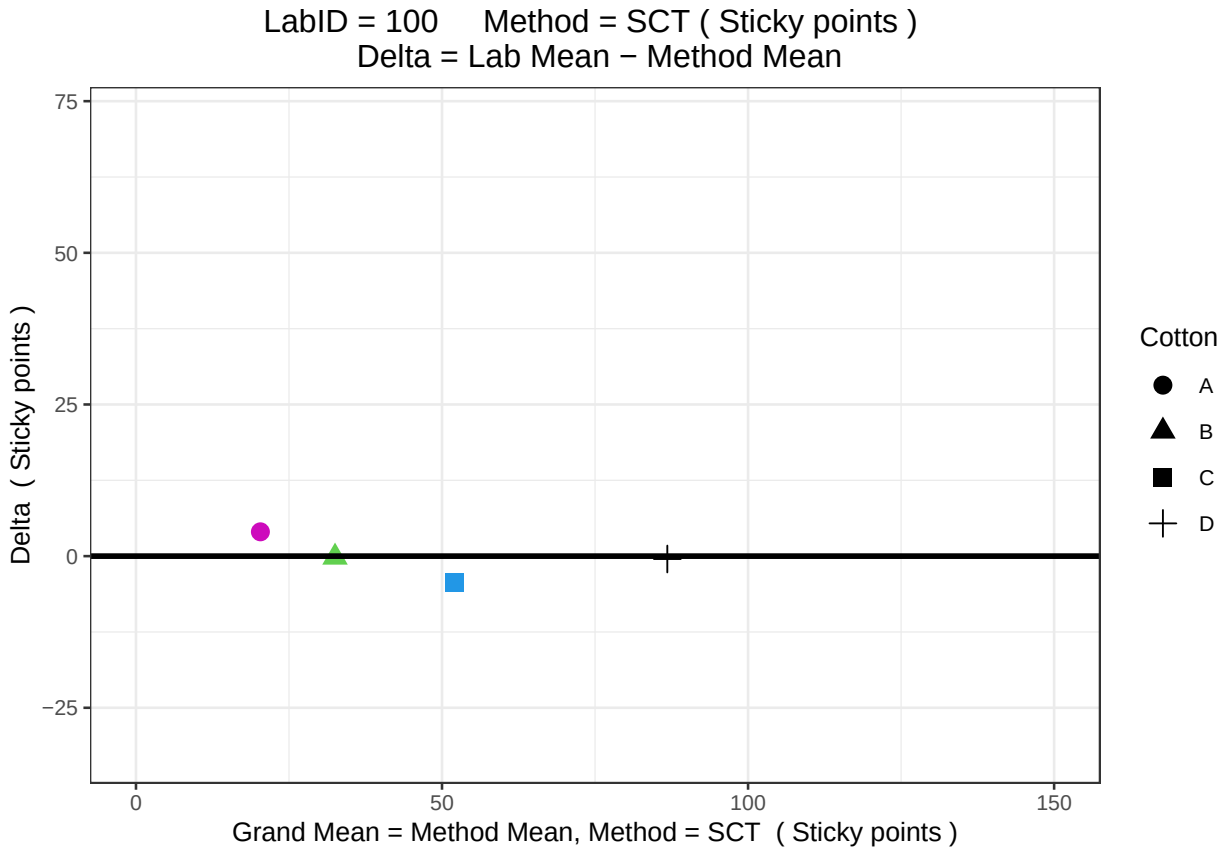

LabID = 20 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

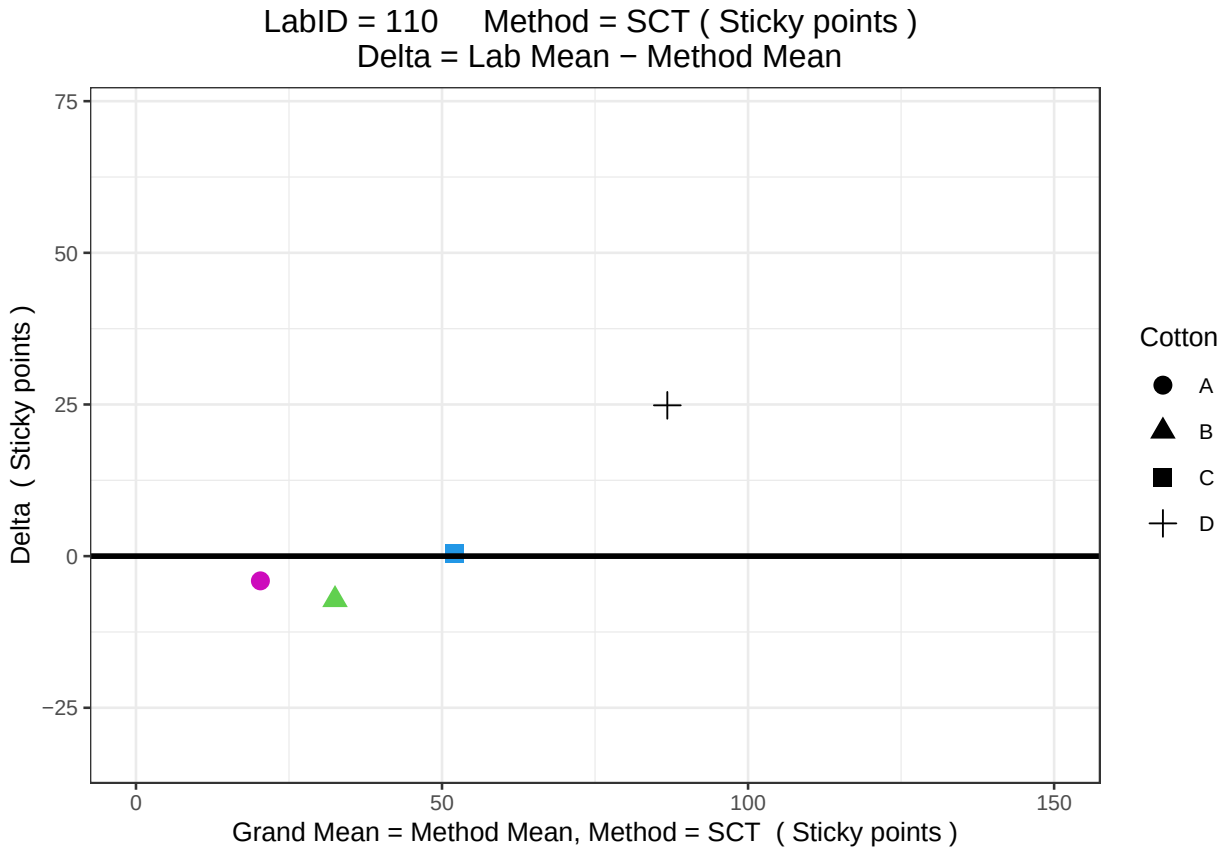

LabID = 30 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

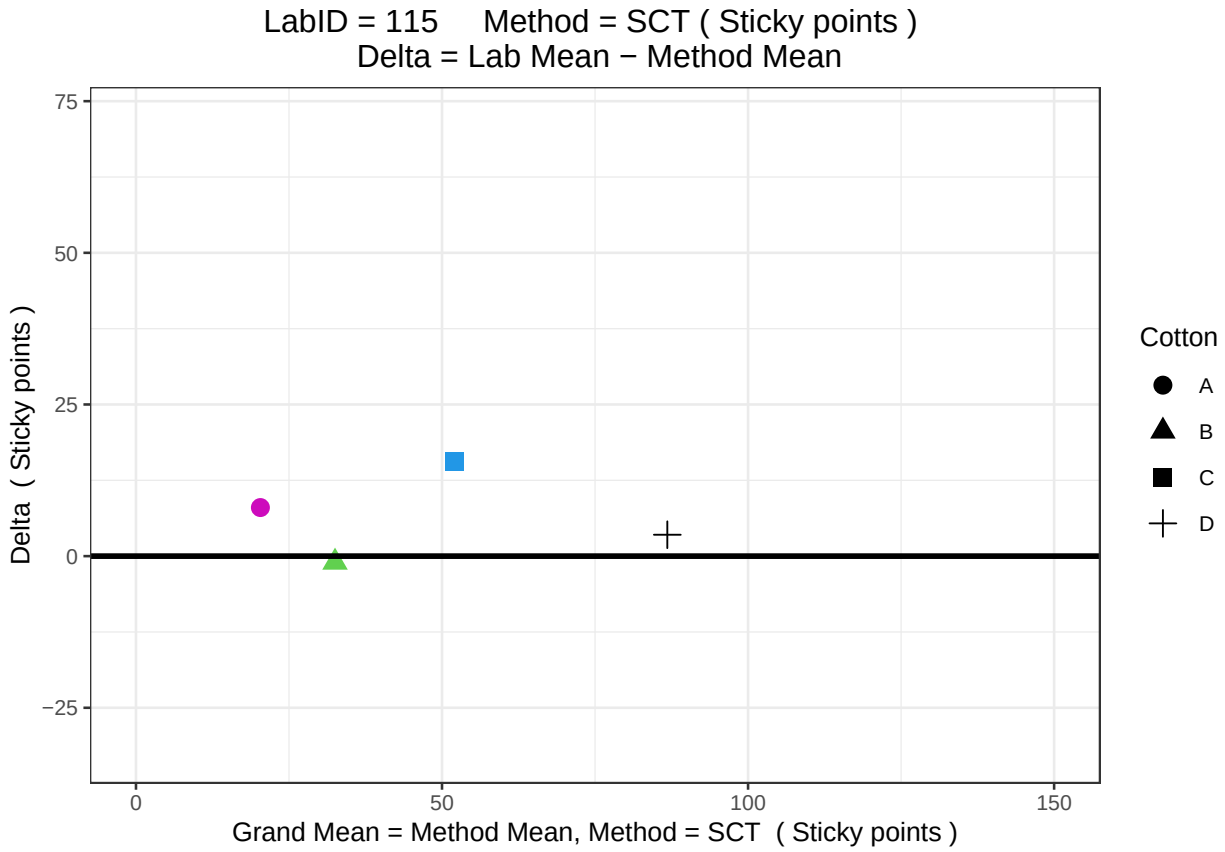

LabID = 40 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

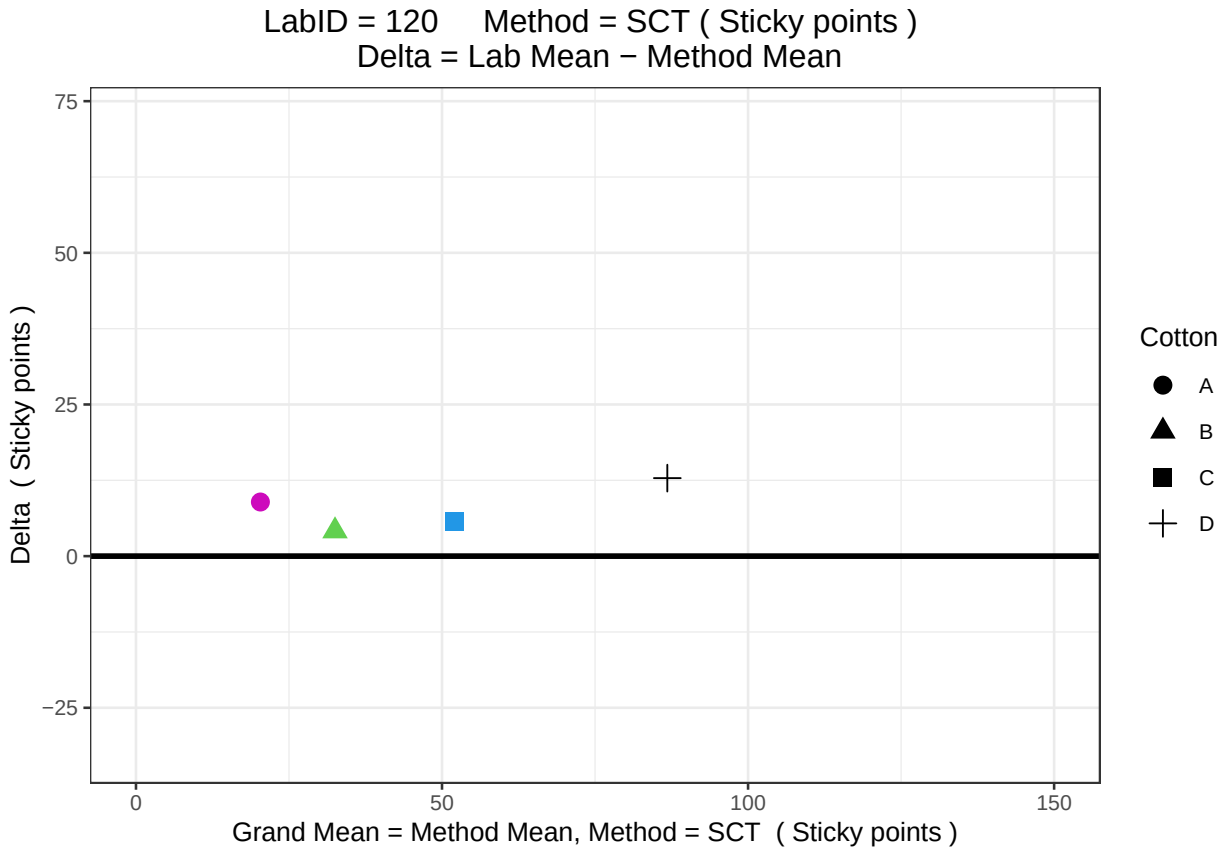

LabID = 70 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
75
50
25
0
−25
Delta (Sticky points)
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

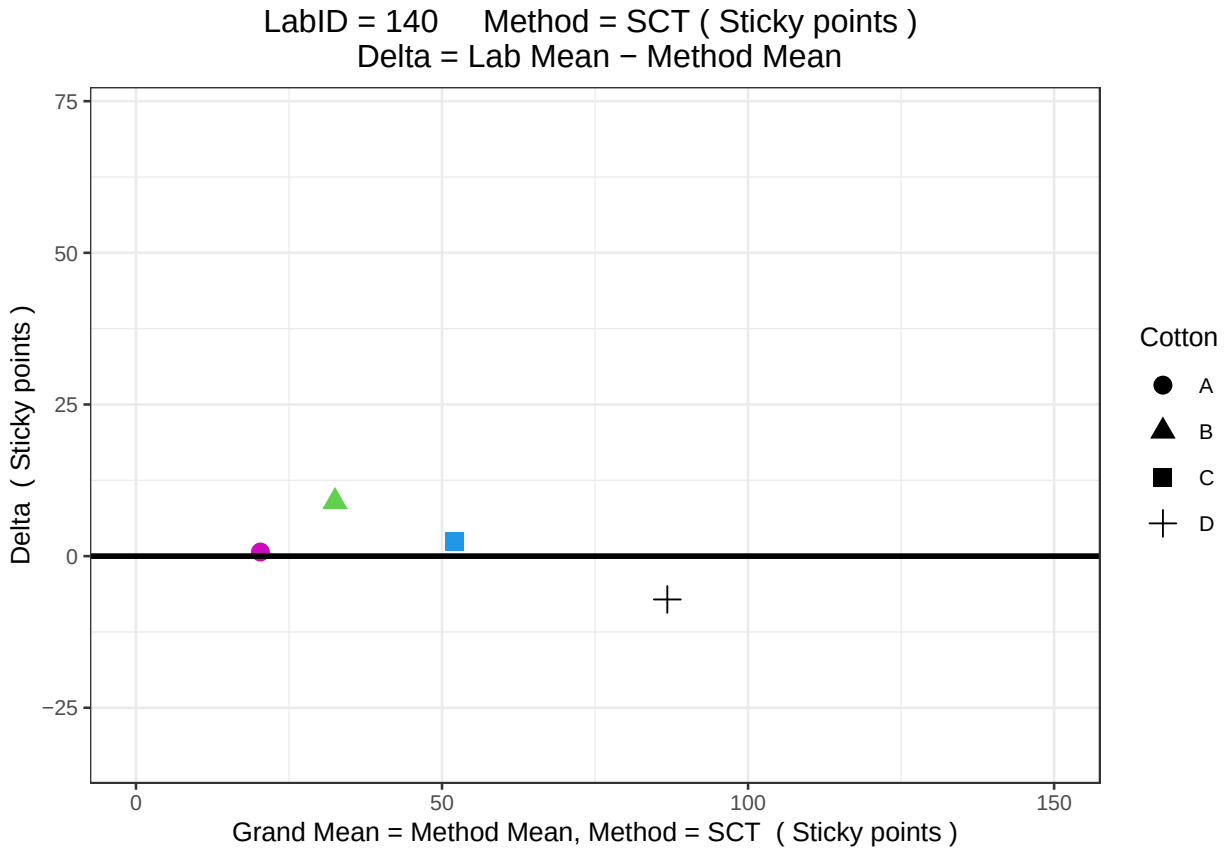

LabID = 75 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

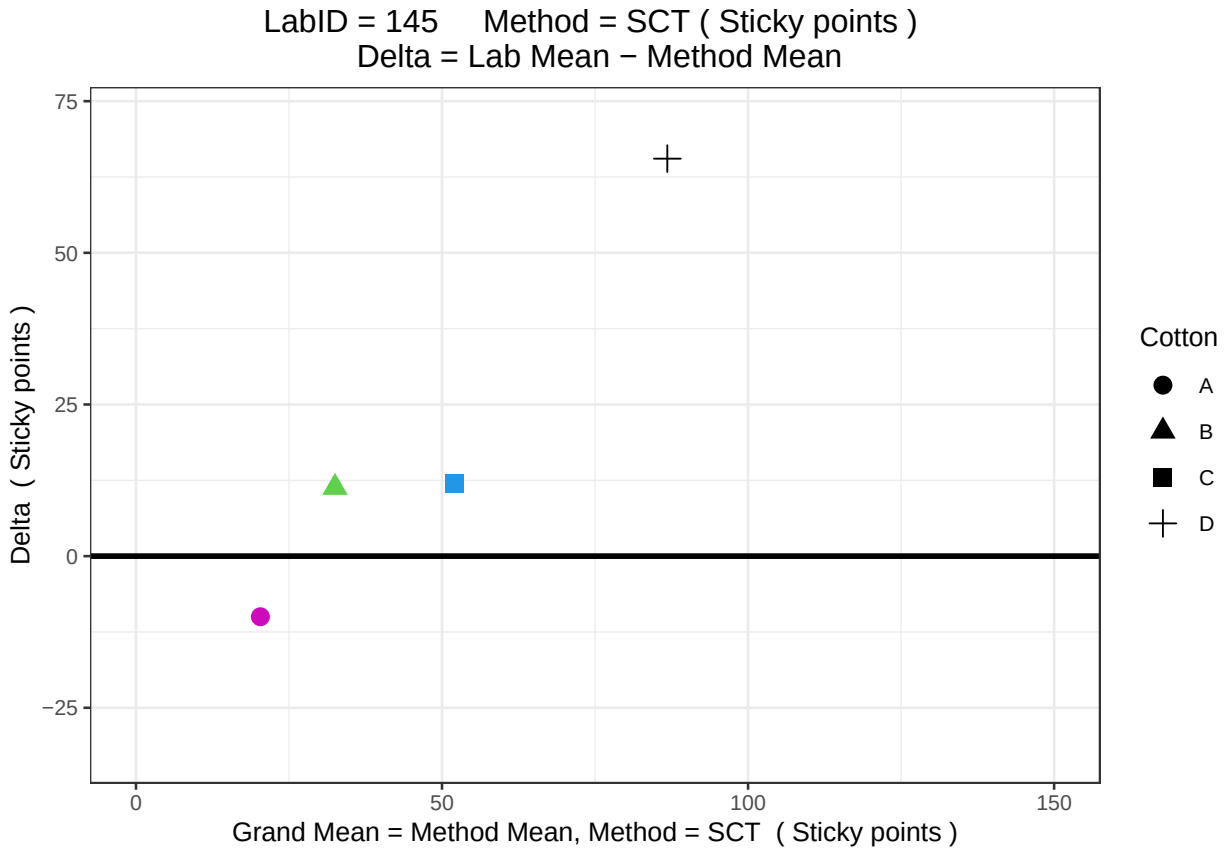

LabID = 100 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D


LabID = 110 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D


LabID = 115 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D


LabID = 120 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
75
50
25
0
−25
Delta (Sticky points)
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D


LabID = 140 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
Delta (Sticky points)
75
50
25
0
−25
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D


LabID = 145 Method = SCT (Sticky points)
Delta = Lab Mean − Method Mean
75
50
25
0
−25
Delta (Sticky points)
0
50
100
150
Grand Mean = Method Mean, Method = SCT (Sticky points)
Cotton
A
B
C
D

CommonScale [6]

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 whith the following formula: $CommonScale = \frac{LabID\ \ reading\ *\ 100}{MaxEver\ \ for\ \ this\ \ method}$, 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
Contest-S	750.0	Contest Grade
GB/T13785-1992	4.0	Color degree
H2SD	70.0	Sticky points
KOTITI	9.0	Kotiti 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.*

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.

[6] Footnote

* 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.

- It **only is safe to compare methods that are measuring the same single phenomenon, stickiness, or phenomenons 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.

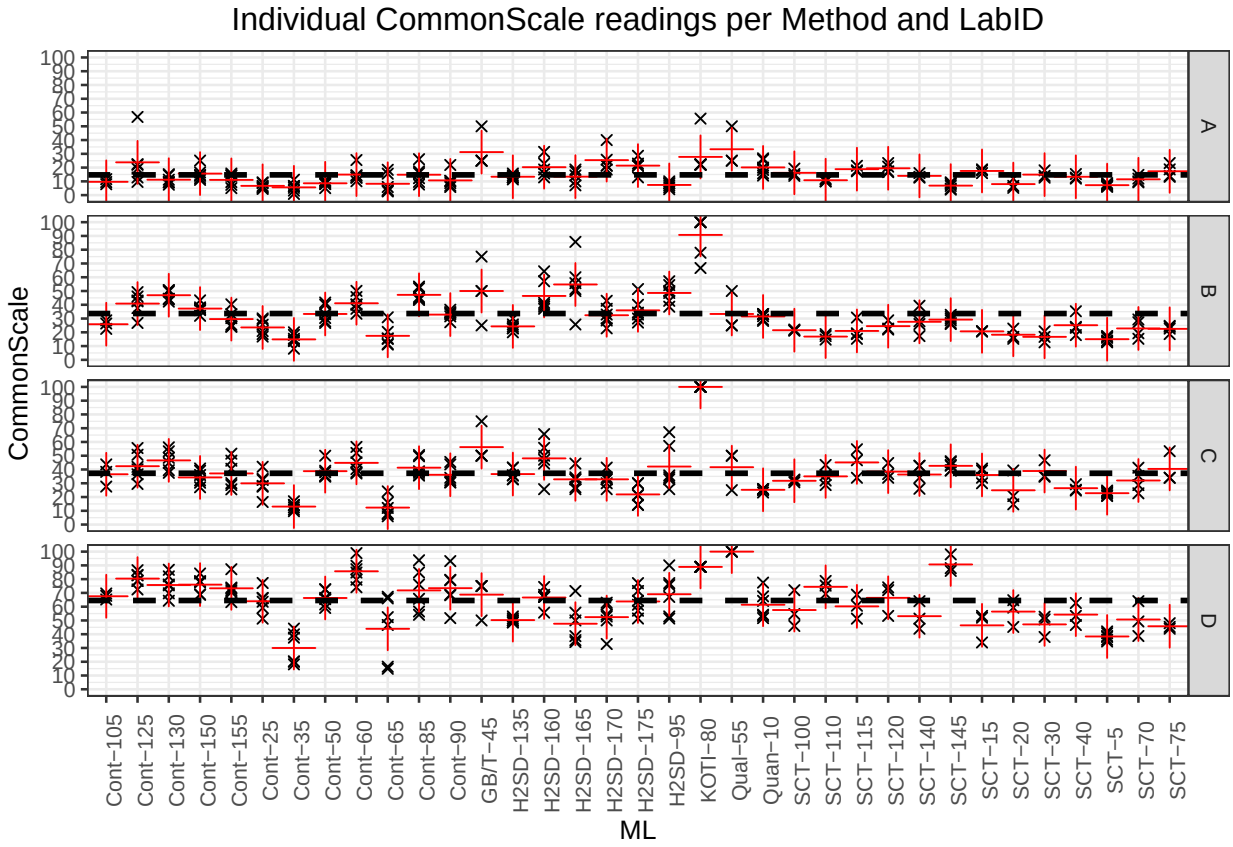
- This CommonScale approach provides results that still are cotton dependent.

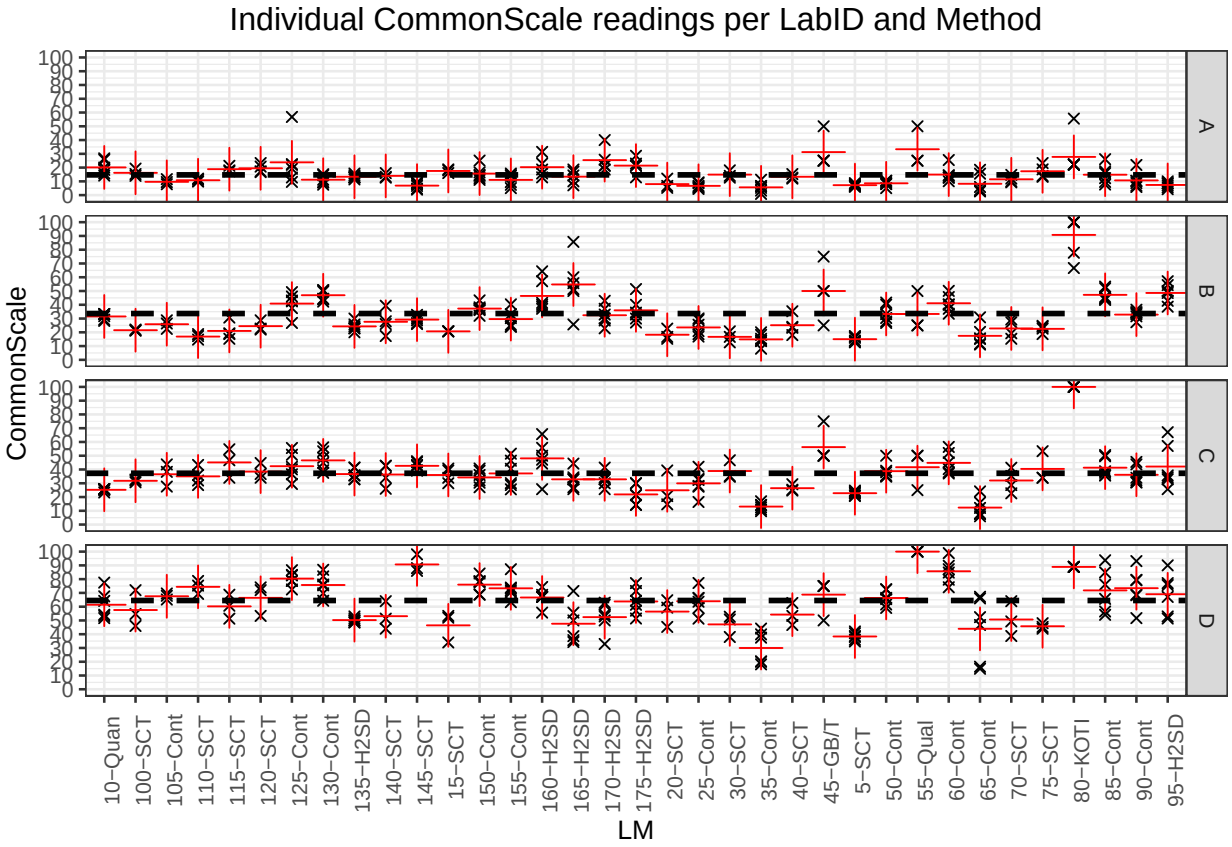
- This CommonScale approach may squeeze the scale for lower or highly stickiness contaminated cottons.

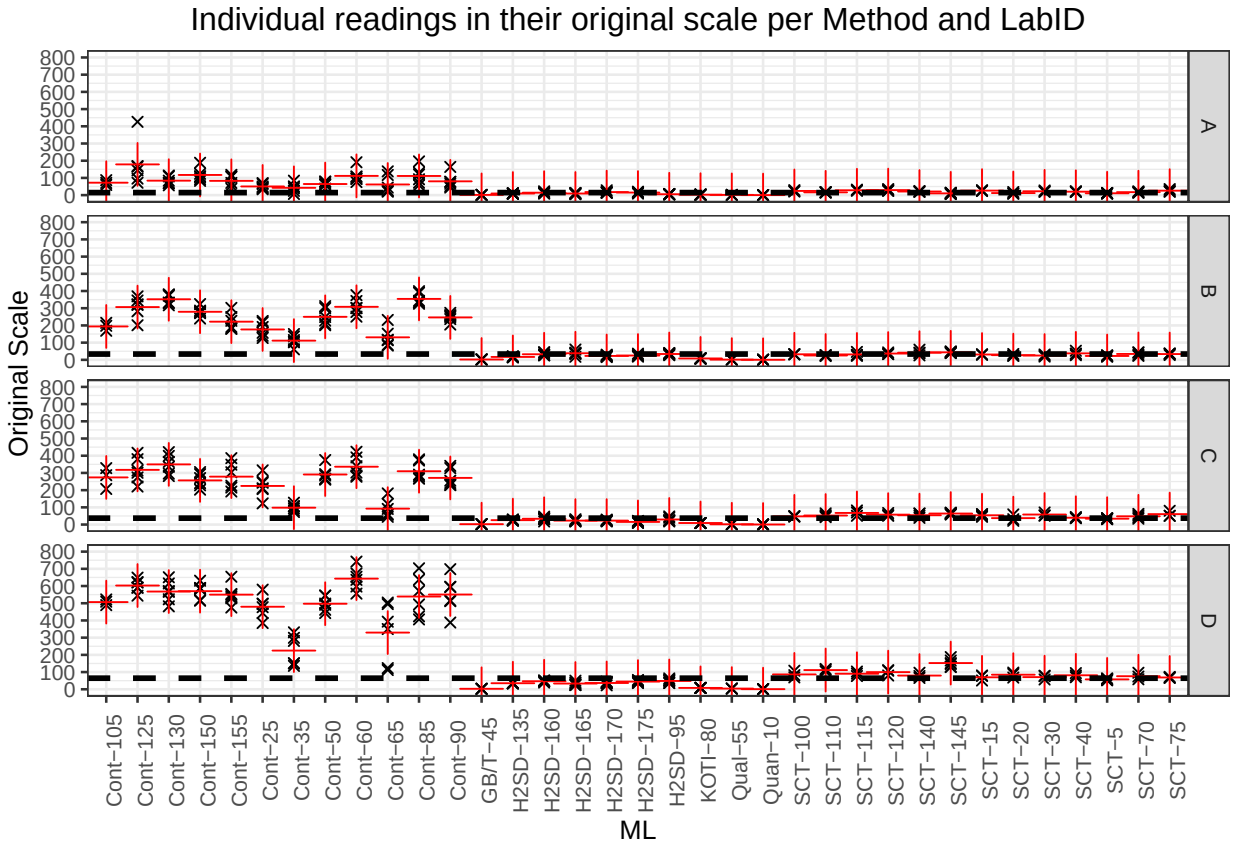
- This CommonScale approach may therefore have incidence on precision and accuracy of gained results.

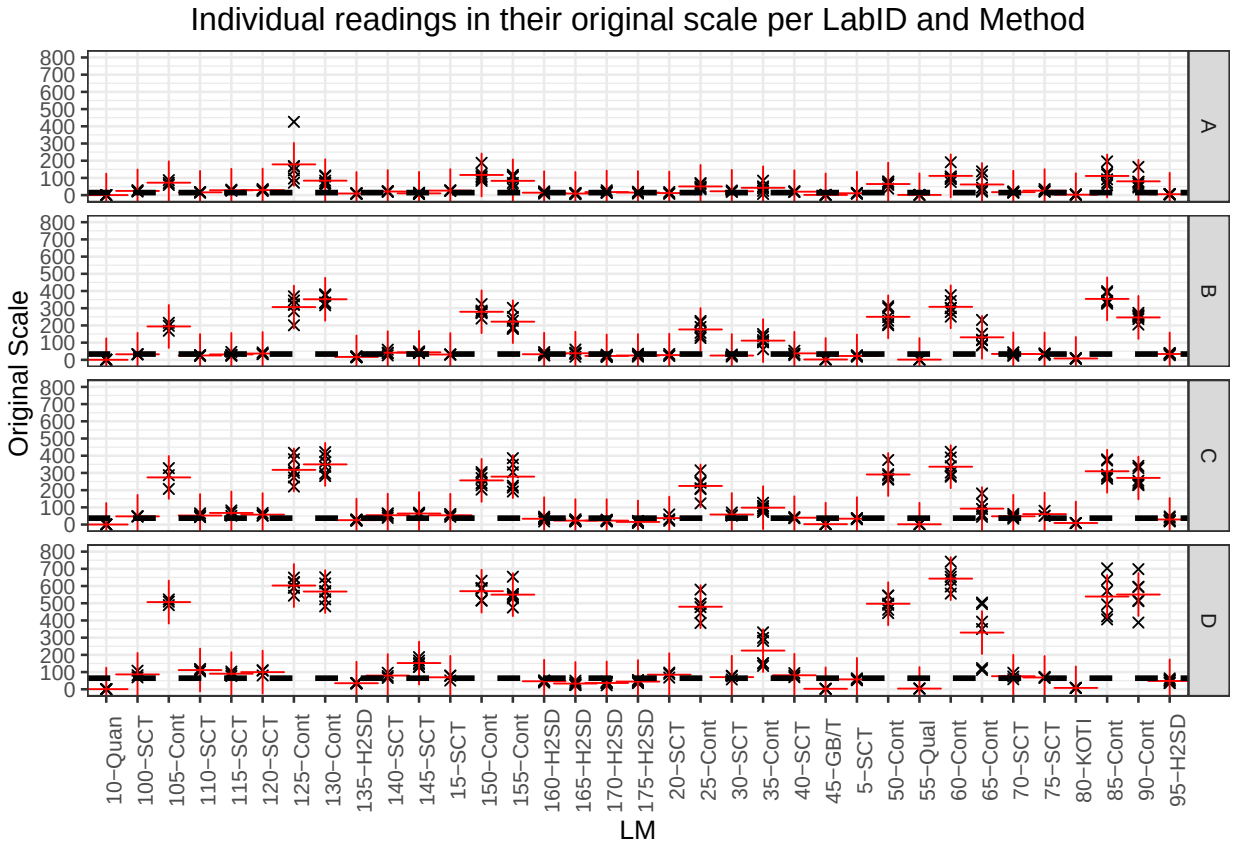
As a conclusion, as said earlier, CommonScale will be experimented at least for some round-tests in order to see if it could help Manufacturers and Users ***to get closer and closer results for each method for the same cottons over time.*** On the long run, the ability of each method to characterize 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
CommonScale
ML
A
B
C
D
Cont−105
Cont−125
Cont−130
Cont−150
Cont−155
Cont−25
Cont−35
Cont−50
Cont−60
Cont−65
Cont−85
Cont−90
GB/T−45
H2SD−135
H2SD−160
H2SD−165
H2SD−170
H2SD−175
H2SD−95
KOTI−80
Qual−55
Quan−10
SCT−100
SCT−110
SCT−115
SCT−120
SCT−140
SCT−145
SCT−15
SCT−20
SCT−30
SCT−40
SCT−5
SCT−70
SCT−75


Individual CommonScale readings per LabID and Method
CommonScale
LM
A
B
C
D
10–Quan
100–SCT
105–Cont
110–SCT
115–SCT
120–SCT
125–Cont
130–Cont
135–H2SD
140–SCT
145–SCT
15–SCT
150–Cont
155–Cont
160–H2SD
165–H2SD
170–H2SD
175–H2SD
20–SCT
25–Cont
30–SCT
35–Cont
40–SCT
45–GB/T
5–SCT
50–Cont
55–Qual
60–Cont
65–Cont
70–SCT
75–SCT
80–KOTI
85–Cont
90–Cont
95–H2SD


Individual readings in their original scale per Method and LabID
Original Scale
ML
A
B
C
D
Cont−105
Cont−125
Cont−130
Cont−150
Cont−155
Cont−25
Cont−35
Cont−50
Cont−60
Cont−65
Cont−85
Cont−90
GB/T−45
H2SD−135
H2SD−160
H2SD−165
H2SD−170
H2SD−175
H2SD−95
KOTI−80
Qual−55
Quan−10
SCT−100
SCT−110
SCT−115
SCT−120
SCT−140
SCT−145
SCT−15
SCT−20
SCT−30
SCT−40
SCT−5
SCT−70
SCT−75


Individual readings in their original scale per LabID and Method
Original Scale
LM
A
B
C
D
10−Quan
100−SCT
105−Cont
110−SCT
115−SCT
120−SCT
125−Cont
130−Cont
135−H2SD
140−SCT
145−SCT
15−SCT
150−Cont
155−Cont
160−H2SD
165−H2SD
170−H2SD
175−H2SD
20−SCT
25−Cont
30−SCT
35−Cont
40−SCT
45−GB/T
5−SCT
50−Cont
55−Qual
60−Cont
65−Cont
70−SCT
75−SCT
80−KOTI
85−Cont
90−Cont
95−H2SD

Overall statistics per Cotton and Method [7]

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 seeing 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.

[7] Footnote

* NA or NaN excluded from the orginal 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
Contest-S	88.2	37.2	42.2	Contest Grade
GB/T13785-1992	1.2	NA	NA	Color degree
H2SD	11.8	4.6	39.3	Sticky points
KOTITI	2.5	NA	NA	Kotiti grade
Qualitative method	1.3	NA	NA	Grade
Quantitative method	0.2	NA	NA	Percent
SCT	20.3	6.6	32.3	Sticky points

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

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Contest-S	244.3	80.3	32.9	Contest Grade
GB/T13785-1992	2.0	NA	NA	Color degree
H2SD	28.3	8.0	28.3	Sticky points
KOTITI	8.2	NA	NA	Kotiti grade
Qualitative method	1.3	NA	NA	Grade
Quantitative method	0.4	NA	NA	Percent
SCT	32.5	6.4	19.8	Sticky points

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

Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Contest-S	258.3	83.5	32.3	Contest Grade
GB/T13785-1992	2.2	NA	NA	Color degree
H2SD	25.0	6.3	25.1	Sticky points
KOTITI	9.0	NA	NA	Kotiti grade
Qualitative method	1.7	NA	NA	Grade
Quantitative method	0.3	NA	NA	Percent
SCT	52.0	10.3	19.8	Sticky points

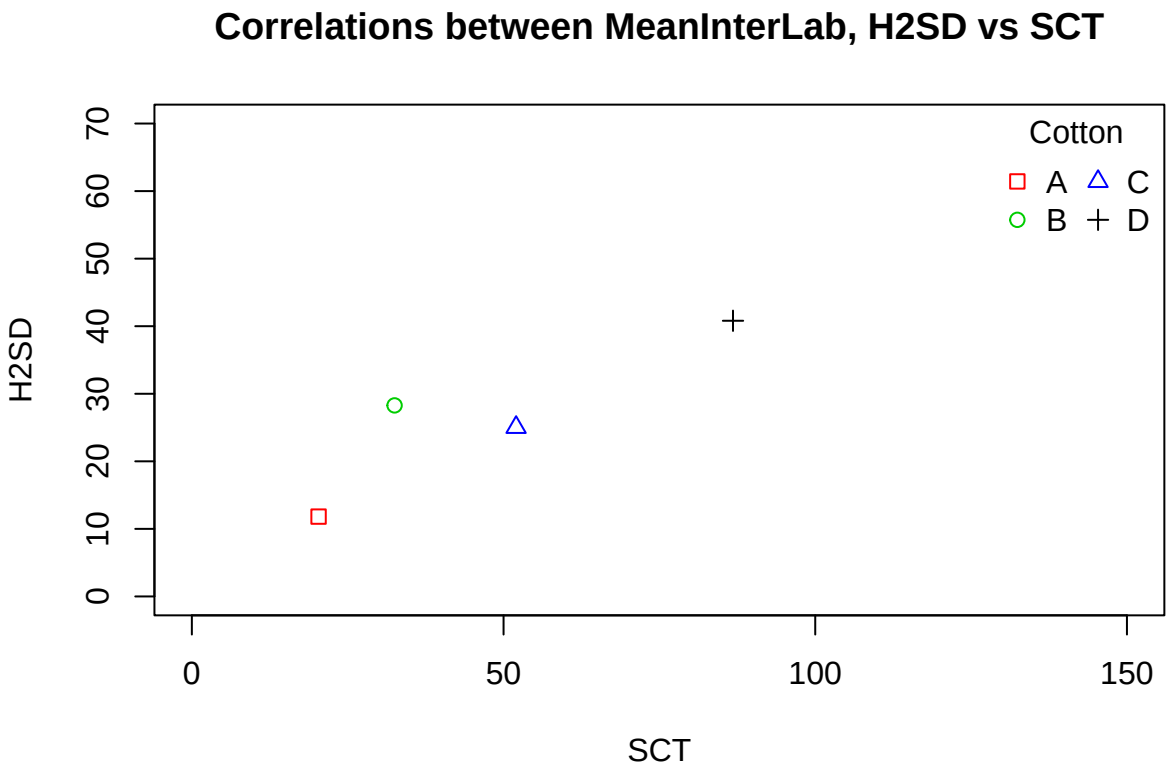
Mean, standard deviation and CV between instruments by method, Cotton D

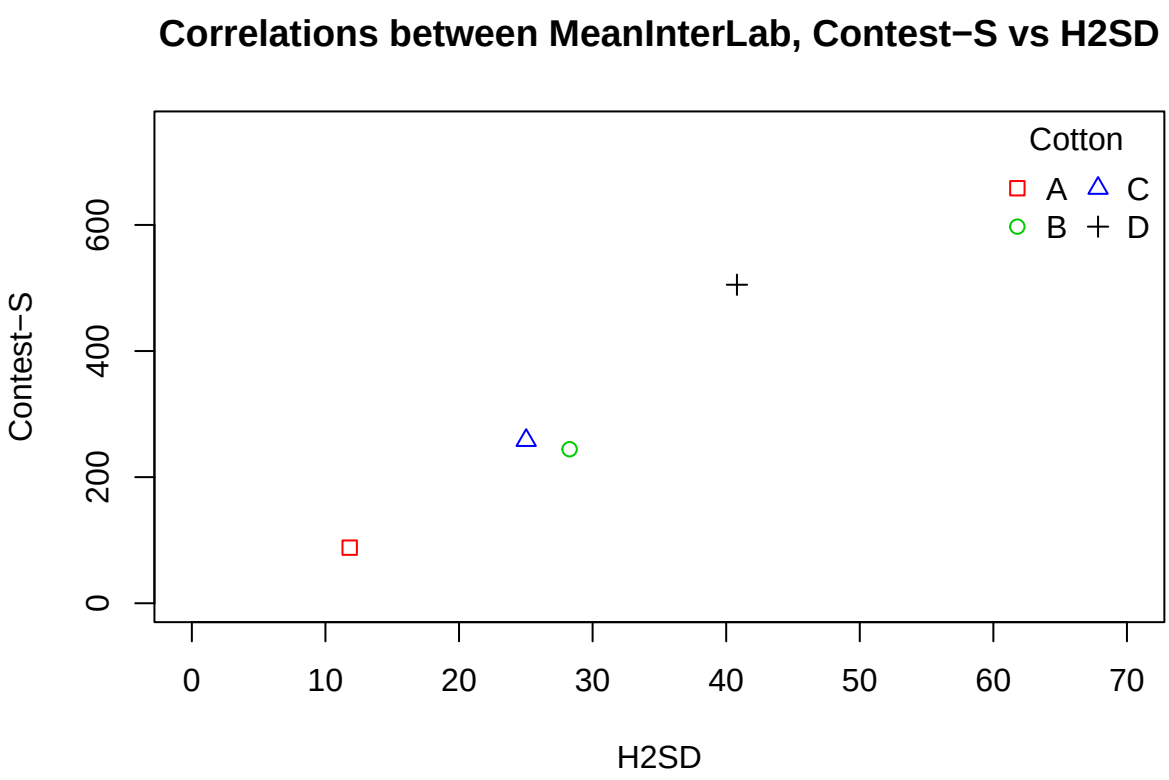
Method	MeanInterLab	SdInterLab	CVInterLab	Unit
Contest-S	505.1	117.6	23.3	Contest Grade
GB/T13785-1992	2.8	NA	NA	Color degree
H2SD	40.8	6.5	15.9	Sticky points
KOTITI	8.0	NA	NA	Kotiti grade
Qualitative method	4.0	NA	NA	Grade
Quantitative method	0.7	NA	NA	Percent
SCT	86.8	24.2	27.9	Sticky points

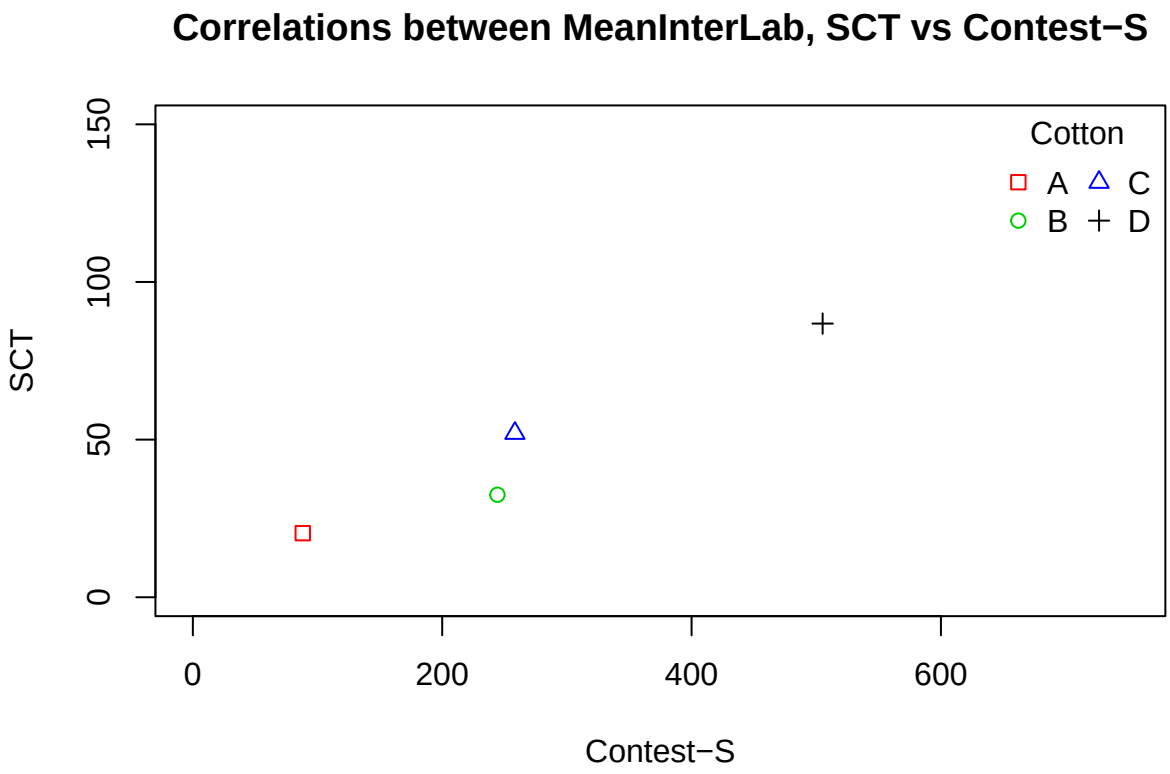
Correlations between MeanInterLabs from above tables, for SCT, H2SD and Contest-S Methods (Starting from RT2025-1 on)

Since 2022, it is now possible to built correlation charts between three methods, namely Contest-S, H2SD and SCT as these Methods gradually came to be the basis for harmonization of stickiness measurement as a first step. The followng charts show the level of agreement of the stickiness measurements based on the tables just displayed in the previous pages (chapter "Overall statistics per Cotton and Method" above).

This correlation analysis only is valid if the range of stickiness is large enough, especially in any measured scale.




Correlations between MeanInterLab, Contest−S vs H2SD
Cotton
A
C
B
D
Contest−S
0
200
400
600
0
10
20
30
40
50
60
70
H2SD



[1] "Correlation H2SD vs SCT is 0.89"

[1] "Correlation Contest-S vs H2SD is 0.98"

[1] "Correlation SCT vs Contest-S is 0.97"

Frequently asked questions (Q) and answers (A) [8]

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.

[8] Footnote
* Based on all round-tests carried out already.

Calculation of Z-Scores for measuring the deviation of any results to the reference value per cotton

In order to alert participating laboratories when their results are deviating too much from the reference results for each cotton, it has been proposed to use the Z-Score system which is well-known and standardized value from laboratories in quality management systems, whatever material is tested or whatever characterization is measured. A Z-Score value usually belongs to the interval -3 to +3, as it is linked to a Normal-Gaussian distribution:

- When the value is belonging to the interval [-1,+1], the measured value given by the participating laboratory is close enough to the reference value for that material, and no alert is necessary to improve the performance of the laboratory;
- When the value is belonging to the intervals [- 2,-1[U]+1,+2], the measured value given by the participating laboratory starts to deviate from the reference value for that material, and a particular attention is demanded to the laboratory personnel to start taking care or to improve the performance of the laboratory;
- When the value is belonging to the intervals [-3,-2[U]+2,+3], the measured value given by the participating laboratory deviates too much from the reference value for that material, and a strong attention and corrections are demanded to the laboratory personnel to strongly improve the performance of the laboratory;
- When the value is belonging to the intervals]less than -3[U]more than +3[, the measured value given by the participating laboratory deviates far too much from the reference value for that material, and strong attentions and corrections are mandatory for the proper practice and better performance of the laboratory.

Z-Scores are calculated based on individual CommonScale results as described in some chapters above. Then, a mean CommonScale value is calculated for each LabID and each Material. Then a distribution is drawn based on these mean CommonScale values, from which Z-Score values are calculated based on Normal Standard Deviations. The reference values are based on the distribution from results of the chosen Methods in 2021 for starting the harmonization efforts, namely: Contest-S, H2SD, SCT as explained in Bremen in October 2022.

This leads to the inclusion of a new table in both Short and Long Reports. In practice, for each LabID, and for each tested material, a Z-Score value is reported in the table. Interpretation of this data is to be made with the above way of thinking (see bullet points just above).

At the end of the day, Z-Score values could be the real information for laboratories in order to harmonize results at a worldwide scale.

Zscore evaluation of each instrument/laboratory
RT2025-1 (based on CommonScale data)

LabID	A	B	C	D
5	-1.19	-1.30	-1.36	-1.53
10	1.26	0.18	-1.08	-0.01
15	0.77	-0.79	0.14	-1.00
20	-1.05	-1.01	-1.12	-0.34
25	-1.29	-0.54	-0.55	0.15
30	0.27	-1.15	0.46	-0.96
35	-1.50	-1.31	-2.46	-2.09
40	-0.03	-0.39	-0.95	-0.49
45	3.38	1.83	2.43	0.47
50	-0.93	0.34	0.45	0.31
55	3.78	0.34	0.78	2.53
60	0.27	1.03	1.14	1.59
65	-1.00	-1.08	-2.55	-1.17
70	-0.38	-0.60	-0.32	-0.72
75	0.73	-0.63	0.64	-1.05
80	2.72	5.47	7.38	1.80
85	0.25	1.58	0.74	0.67
90	-0.53	0.30	0.15	0.78
95	-1.17	1.70	0.83	0.49
100	0.51	-0.71	-0.34	-0.27
105	-0.73	-0.33	0.20	0.39
110	-0.51	-1.13	0.02	0.84
115	1.02	-0.76	1.17	-0.09
120	1.14	-0.45	0.42	0.32
125	1.97	1.01	0.86	1.24
130	-0.44	1.56	1.34	0.93
135	-0.03	-0.47	0.21	-0.75
140	0.10	-0.17	0.18	-0.56
145	-1.26	-0.03	0.89	2.63
150	0.41	0.69	-0.06	0.95
155	-0.46	0.01	0.26	0.77
160	1.30	1.51	1.50	0.33
165	-0.02	2.26	-0.22	-0.92
170	2.27	0.26	-0.22	-0.61
175	1.51	0.57	-1.46	0.14

Highlighted values in orange indicates a quite large deviation to the expected stickiness value for that cotton. Corrective actions may be necessary.

Software components to realize this report [9]

Software code version: July 10, 2025 by Jean-Paul Gourlot

R version 4.4.2 (2024-10-31 ucrt) Platform: x86_64-w64-mingw32/x64 Running under: Windows 11 x64 (build 26100)

Matrix products: default

locale: [1] LC_COLLATE=French_France.utf8 LC_CTYPE=French_France.utf8 LC_MONETARY=French_France.utf8 LC_NUMERIC=C LC_TIME=French_France.utf8

time zone: Europe/Paris tzcode source: internal

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

other attached packages: [1] tinytex_0.54 rmarkdown_2.29 markdown_1.13 ggplot2_3.5.1 reshape2_1.4.4 xlsx_0.6.5 xlsxjars_0.6.1 rJava_1.0-11 knitr_1.49 readxl_1.4.3

loaded via a namespace (and not attached): [1] rematch_2.0.0 gtable_0.3.6 dplyr_1.1.4 compiler_4.4.2 tidyselect_1.2.1 Rcpp_1.0.13-1 stringr_1.5.1 scales_1.3.0
[9] yaml_2.3.10 fastmap_1.2.0 R6_2.5.1 plyr_1.8.9 labeling_0.4.3 generics_0.1.4 tibble_3.2.1 munsell_0.5.1
[17] pillar_1.9.0 rlang_1.1.4 utf8_1.2.4 stringi_1.8.4 xfun_0.49 cli_3.6.3 withr_3.0.2 magrittr_2.0.3
[25] digest_0.6.37 lifecycle_1.0.4 vctrs_0.6.5 evaluate_1.0.1 glue_1.8.0 farver_2.1.2 cellranger_1.1.0 fansi_1.0.6
[33] colorspace_2.1-1 tools_4.4.2 pkgconfig_2.0.3 htmltools_0.5.8.1

[1] “ICCTM-ITMF-RTStick 2025-1_Long_2025-07-10_Raw”

[9] Footnote
* List of all R components for processing the data

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:

- Seven methods (in past RTS, up to eleven methods were participating) for measuring stickiness were used. Please see our conclusions in Bremen Conferences (see link below), for trying to make according decision for labs's future testing instrumentation and procedures.

- Thirty five instruments participated to this test. On our side, we were not able to easily deliver samples to some laboratories due to restrictions by carriers, and the final date to submit data was postponed to May 4, 2025. With all data available we prepared this report that is the only official one for ever.

- Maybe following the March 2021 meeting in Bremen, three methods are now counting a good participation (SCT (13), Contest-S (12) and H2SD (6)), while some methods now tend to reduce or disappear from some RTs already. Maybe also it is because participants had a look on past reports and Bremen ITMF-ICCTM presentations and saw our effort in the harmonization process focusing on thermo-mechanical methods mainly (see link below).

- 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 within and between laboratories using the same method, inducing somewhat low levels of reproducibility in the measurements. **It should be noticed that stickiness, due to its manifestation, has always been variable in 'real-life' samples; it also is the case when 'prepared samples' as in this RT, but to a lesser degree.**

- It seems that this variation slightly reduced recently, but we need to find a criteria to measure it properly; 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.

- 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.

- 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 .

- Lately, in Bremen (October 2022, see https://www.itmf.org/images/dl/reports/icctm-reports/ICCTM-Report-2022.pdf), it was proposed to use Z-Scores to express the distance of every individual measurement result (transformed in CommonScale) to a reference value for this cotton sample, knowing that the reference result is based on taking care on thermo-mechanic methods results only (based on 2021 decisions). A chapter is again devoted to this criterion in this report.

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 for providing any piece of information of their interest. Please note that preparing and dispatching samples has a cost and therefore 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 Axel Drieling. Every thing will remain confidential at any time.

Finally, next round-test samples may 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.