C. elegans length measurements comparison between WorMe and manually obtained with Fiji ImageJ, applying the manual bias error in WorMe.

In this little experiment we check if the measures between manually obtained by Fiji and automatically obtained with WorMe have the same means.

We have data of three different *C. elegans* sets of images: C24, C48 and C72. Every set is different time of development of *C. elegans*, and different images characteristics.

In the study we show the measurements obtained from **WorMe applying the manual bias error** is the same than the measurements obtained manually from the ImageJ. The manual bias error is actioned when despite of obtain the length from the euclidean distance between every pixel in the skeletonized line of C. elegans, we obtain this length every 5 pixels, emulating the manual polyline measurement.

First, we study the normality of the data, and then we visualize boxplot and histogram between every set of sample (C24, C48 and C72), between the measurement automatiacally by WorMe and the measurement obtained manually by imageJ.

dades_cru = 57×6 table

	C24_Fiji	C48_Fiji	C72_Fiji	C24_WM	C48_WM	C72_WM
1	399.0560	729.8520	954.2280	259.3070	795.2250	1.0936e+03
2	338.1020	703.3430	895.6460	236.1370	726.8930	956.8960
3	474.7710	663.1100	1.0118e+03	368.6620	785.1470	875.4530
4	348.2540	753.3160	1.1203e+03	429.2330	732.7130	1.0227e+03
5	365.2640	607.7300	1.0378e+03	367.3320	713.7630	1.0924e+03
6	335.0930	903.5900	1.1625e+03	309.2900	695.9610	1.0128e+03
7	371.8660	696.1980	1.1997e+03	397.4710	693.7050	1.1288e+03
8	387.6190	709.8600	986.5110	491.7160	628.9350	1.1746e+03
9	466.0800	727.4130	1.0236e+03	327.3730	851.9690	989.2300
10	415.0550	735.8050	1.0923e+03	376.0340	689.7630	999.7950
11	352.3310	688.3520	813.6230	372.6840	694.5270	1.0798e+03
12	330.3740	628.6150	1.1122e+03	315.6770	750.5540	801.5050
13	395.1990	647.5520	928.9610	387.2730	728.6150	889.5290
14	375.5370	649.6490	1.0088e+03	381.9650	806.4300	1.0979e+03
15	467.7300	736.2760	981.2910	332.1290	704.7730	966.7060
16	341.0440	757.4380	1.1406e+03	281.5410	724.3880	895.7230
17	427.1670	832.3410	1.0963e+03	266.5770	527.2290	984.9430

	C24_Fiji	C48_Fiji	C72_Fiji	C24_WM	C48_WM	C72_WM
18	405.7900	688.6960	1.0176e+03	434.2810	698.3150	1.1282e+03
19	283.3970	680.1670	1.0387e+03	346.3900	691.2300	932.9550
20	378.0810	612.3560	1.1369e+03	467.3650	675.4270	1.0694e+03
21	380.0520	707.2910	1.1672e+03	347.2970	658.4570	1.0113e+03
22	358.1740	681.4550	986.0800	370.0360	742.7750	1.0326e+03
23	306.8620	543.2080	1.0319e+03	332.0970	699.0980	1.1334e+03
24	417.2100	745.8520	1.1945e+03	374.2370	643.4030	1.1469e+03
25	394.9620	687.5930	1.0349e+03	395.4970	739.4310	995.0620
26	369.6720	733.4220	1.1479e+03	470.8210	583.2310	1.0211e+03
27	429.8490	744.7730	1.0292e+03	413.9950	902.0240	1.1880e+03
28	367.6950	664.8380	947.1100	354.5490	685.5920	1.0153e+03
29	303.8510	712.1490	799.7970	267.7450	679.4920	1.1244e+03
30	385.8880	776.3380	1.1376e+03	328.0110	731.3010	805.1570
31	480.0090	697.2660	1.0649e+03	469.4530	730.3330	970.5040
32	329.3250	768.5050	903.5640	342.7560	653.2440	1.1293e+03
33	382.7290	723.2860	1.1383e+03	437.9320	685.8010	791.3710
34	368.0570	718.3990	1.0735e+03	408.7690	613.5610	1.0886e+03
35	311.3590	679.0970	1.1927e+03	292.3820	632.9290	890.9540
36	355.6600	694.7210	1.0746e+03	383.3390	717.6050	1.1059e+03
37	322.8030	639.3040	974.3780	376.5740	752.5560	1.0865e+03
38	326.9040	842.4630	1.2471e+03	312.0320	842.3200	1.1541e+03
39	417.3940	665.5620	1.1202e+03	436.0280	667.1500	964.6960
40	385.3600	701.5470	1.0509e+03	328.7000	687.0560	1.0426e+03
41	414.4860	755.6980	1.1658e+03	396.8000	617.5660	1.2290e+03
42	377.8760	720.0970	1.0742e+03	NaN	720.6920	1.0971e+03
43	417.1010	795.1580	907.6130	NaN	517.0900	1.0277e+03
44	327.4960	720.8590	915.7600	NaN	677.4250	1.1085e+03
45	298.6340	719.7940	987.6650	NaN	737.0870	1.0709e+03
46	257.8750	702.0220	856.1100	NaN	749.4340	895.4150
47	451.5520	697.0740	1.0962e+03	NaN	673.4090	893.0810
48	247.5920	672.9750	1.0788e+03	NaN	723.8500	963.1910
49	257.3420	657.7640	833.1760	NaN	756.1190	862.4440
50	322.7070	532.4870	935.9440	NaN	843.2950	1.0889e+03

	C24_Fiji	C48_Fiji	C72_Fiji	C24_WM	C48_WM	C72_WM
51	NaN	NaN	942.1740	NaN	719.7600	1.0685e+03
52	NaN	NaN	975.9120	NaN	666.5880	823.8200
53	NaN	NaN	NaN	NaN	706.0540	902.5490
54	NaN	NaN	NaN	NaN	NaN	941.8810
55	NaN	NaN	NaN	NaN	NaN	994.5710
56	NaN	NaN	NaN	NaN	NaN	1.1570e+03
57	NaN	NaN	NaN	NaN	NaN	914.8310

propietats_dades_cru = 1×6 cell
'C24_Fiji'   'C48_Fiji'   'C72_Fiji'   'C24_WM'   'C48_WM'   'C72_WM'
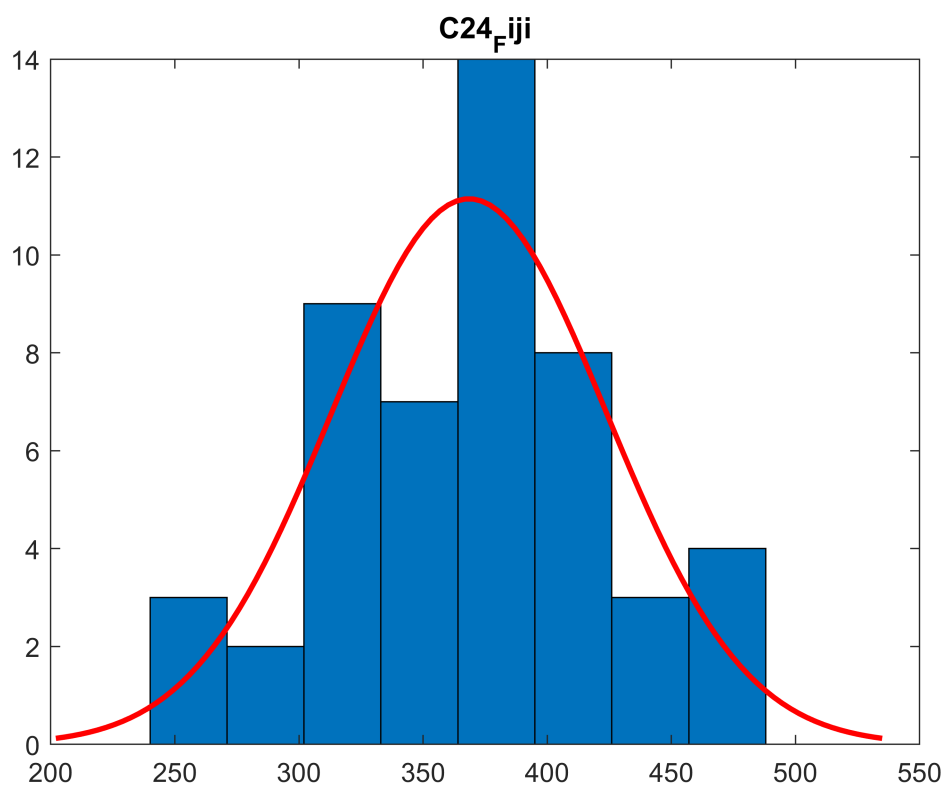
C24$_F$iji

Shapiro test: There is NO normality. p-val: 0.75503
descript_dades_sing = 7×1 table

	C24_Fiji
1 mean	368.4857
2 std	55.4734
3 n	50
4 Std error mean	7.8451

3

	C24_Fiji
5 Max	480.0090
6 Min	247.5920
7 Range	232.4170
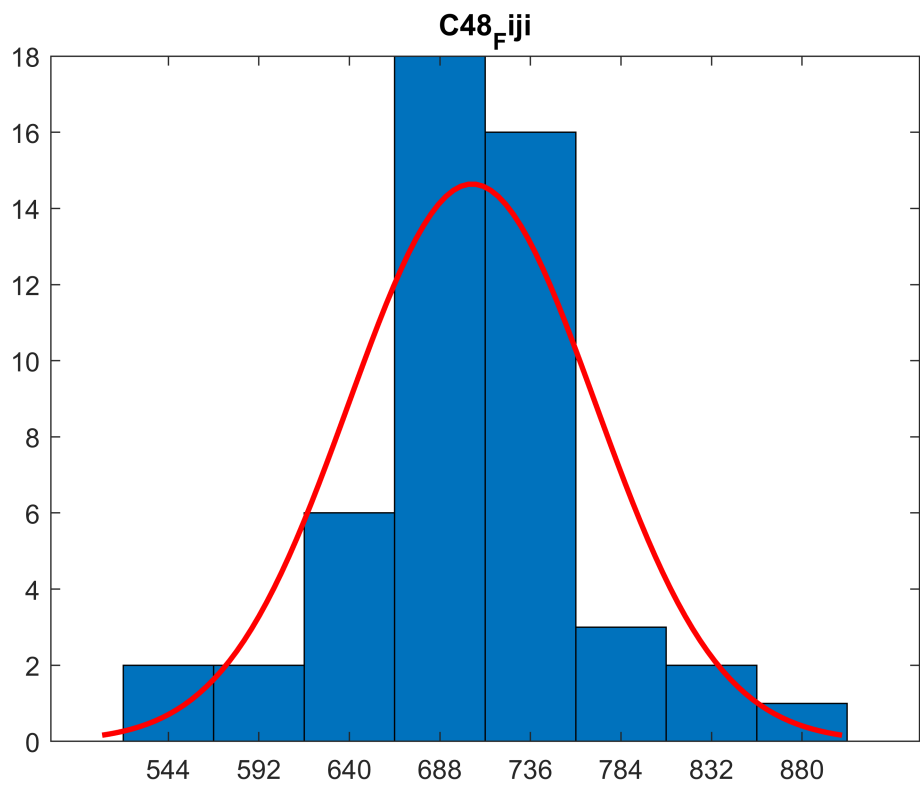
C48_Fiji

Shapiro test: There is normality. p-val: 0.028553
descript_dades_sing = 7×1 table

	C48_Fiji
1 mean	705.0531
2 std	65.3946
3 n	50
4 Std error mean	9.2482
5 Max	903.5900
6 Min	532.4870
7 Range	371.1030
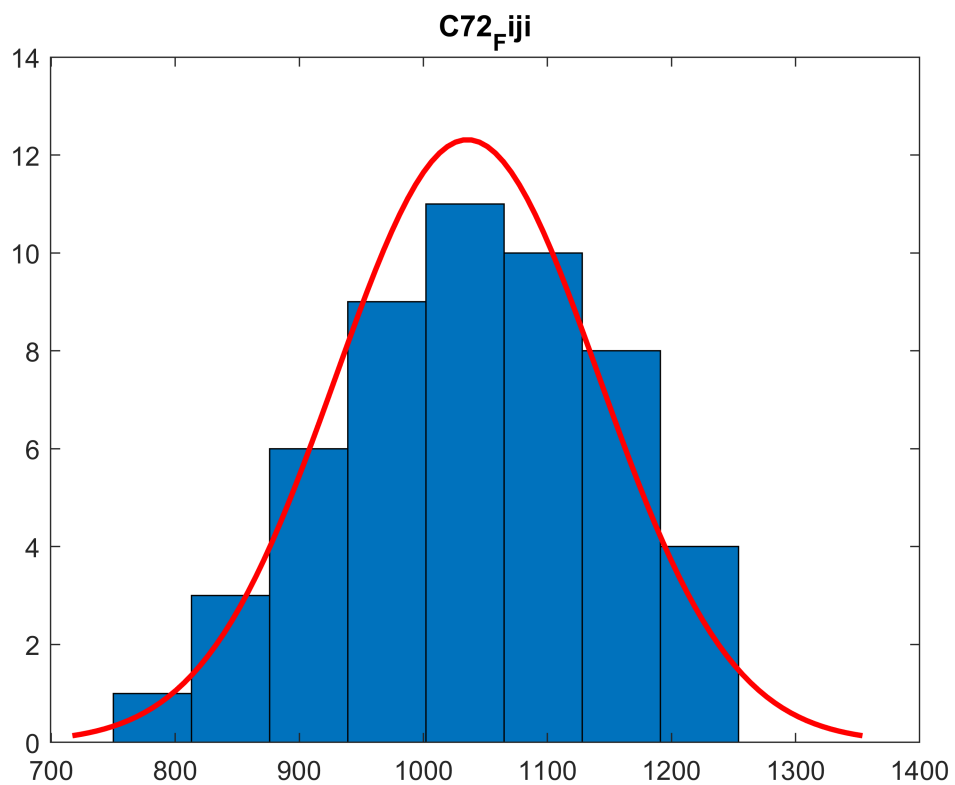
C72$_F$iji

Shapiro test: There is NO normality. p-val: 0.67909
descript_dades_sing = 7×1 table

	C72_Fiji
1 mean	1.0355e+03
2 std	106.1374
3 n	52
4 Std error mean	14.7186
5 Max	1.2471e+03
6 Min	799.7970
7 Range	447.2610
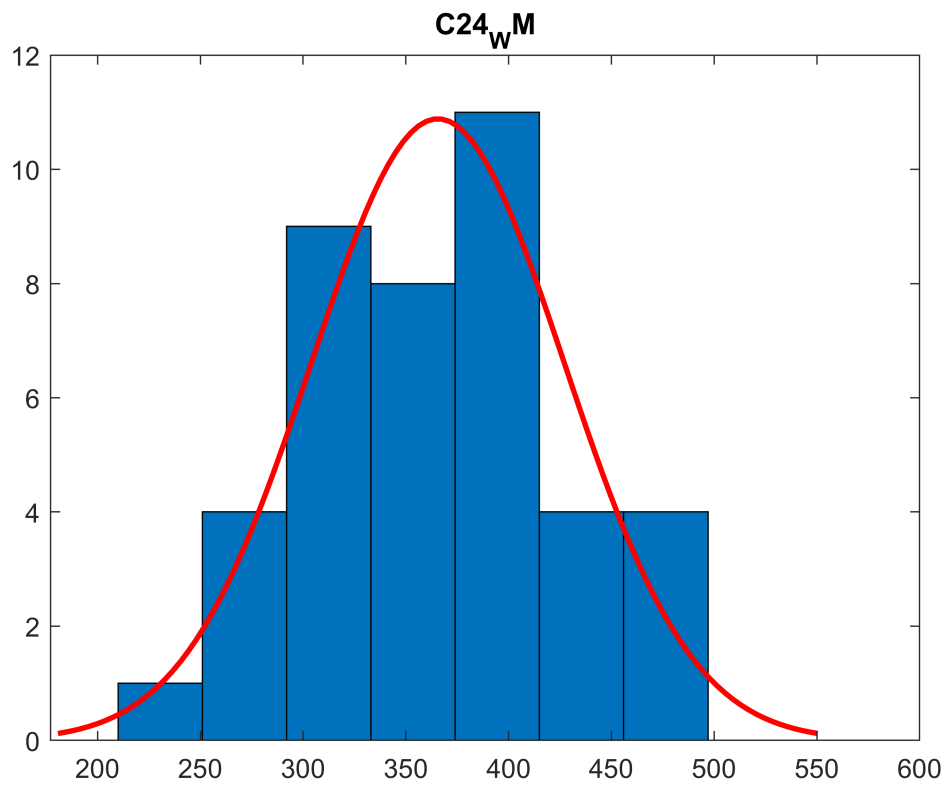
C24$_W$M

Shapiro test: There is NO normality. p-val: 0.87855
descript_dades_sing = 7×1 table

	C24_WM
1 mean	365.5485
2 std	61.6096
3 n	41
4 Std error mean	9.6218
5 Max	491.7160
6 Min	236.1370
7 Range	255.5790
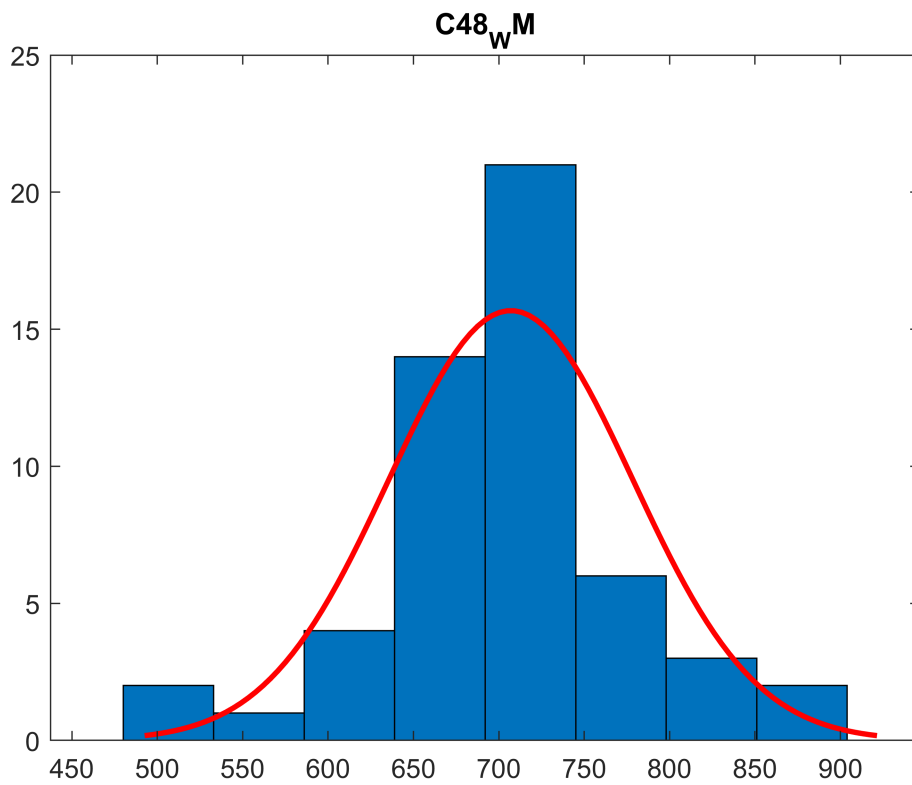
C48$_W$M

Shapiro test: There is normality. p-val: 0.037411
descript_dades_sing = 7×1 table

	C48_WM
1 mean	707.0055
2 std	71.4710
3 n	53
4 Std error mean	9.8173
5 Max	902.0240
6 Min	517.0900
7 Range	384.9340
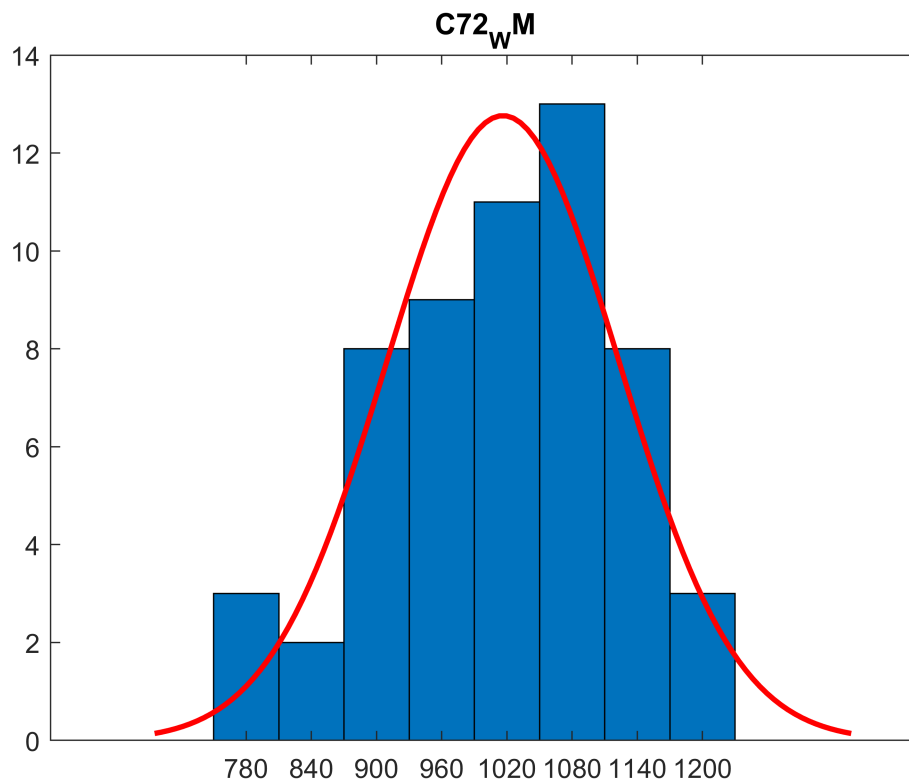
C72$_W$M

Shapiro test: There is NO normality. p-val: 0.23794

descript_dades_sing = 7×1 table

	C72_WM
1 mean	1.0163e+03
2 std	106.8892
3 n	57
4 Std error mean	14.1578
5 Max	1.2290e+03
6 Min	791.3710
7 Range	437.5870

descript_dades_total = 7×6 table

|	C24_Fiji	C48_Fiji	C72_Fiji	C24_WM	C48_WM	C72_WM
1 mean	368.4857	705.0531	1.0355e+03	365.5485	707.0055	1.0163e+03
2 std	55.4734	65.3946	106.1374	61.6096	71.4710	106.8892
3 n	50	50	52	41	53	57
4 Std error mean	7.8451	9.2482	14.7186	9.6218	9.8173	14.1578
5 Max	480.0090	903.5900	1.2471e+03	491.7160	902.0240	1.2290e+03
6 Min	247.5920	532.4870	799.7970	236.1370	517.0900	791.3710
7 Range	232.4170	371.1030	447.2610	255.5790	384.9340	437.5870

```
array_dades_tot = 1×303
10³ ×
    0.3991    0.3381    0.4748    0.3483    0.3653    0.3351    0.3719    0.3876 ···
array_repetits_categories_categorical = 1×303 categorical
C24_Fiji    C24_Fiji    C24_Fiji    C24_Fiji    C24_Fiji    C24_Fiji    C2 ···
```

C24$_F$iji vs C24$_W$M

C24$_F$iji vs C24$_W$M
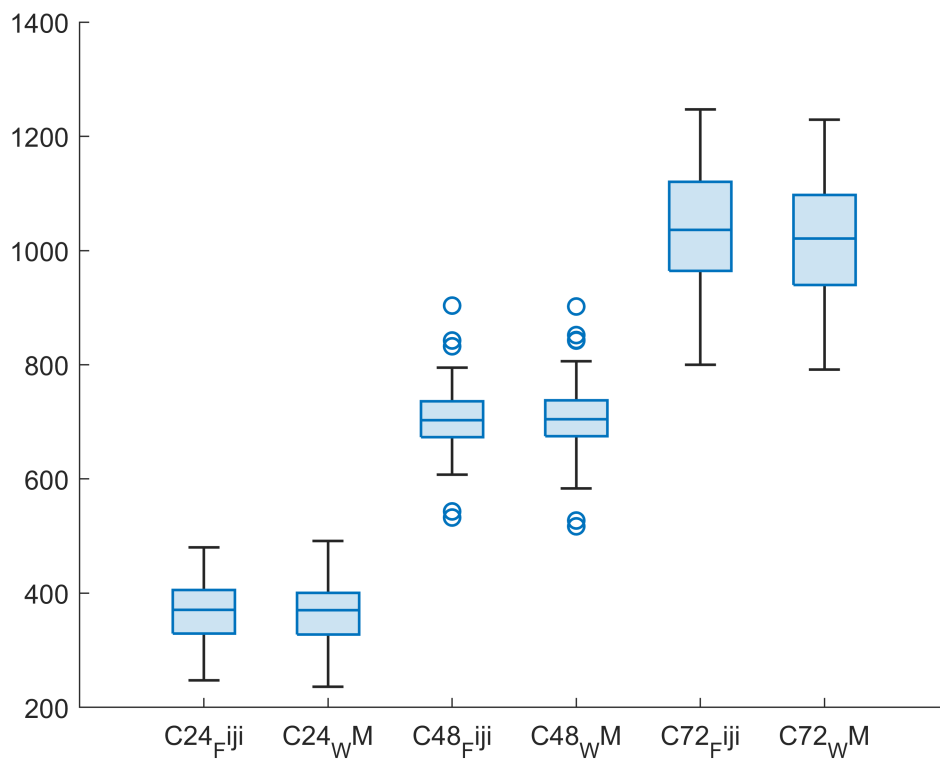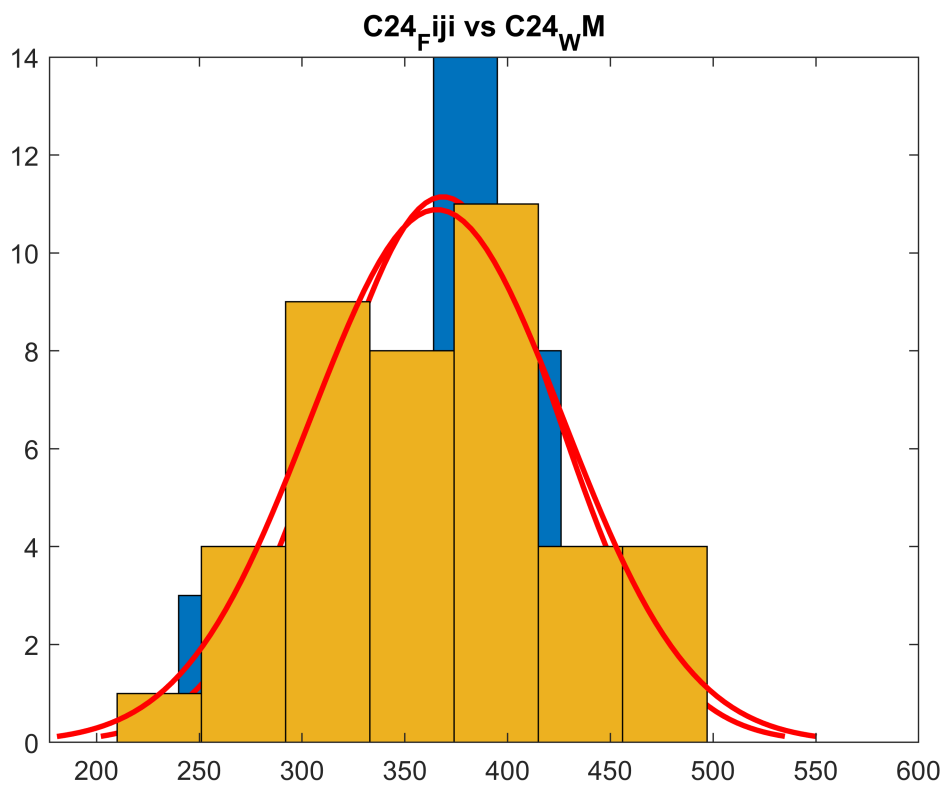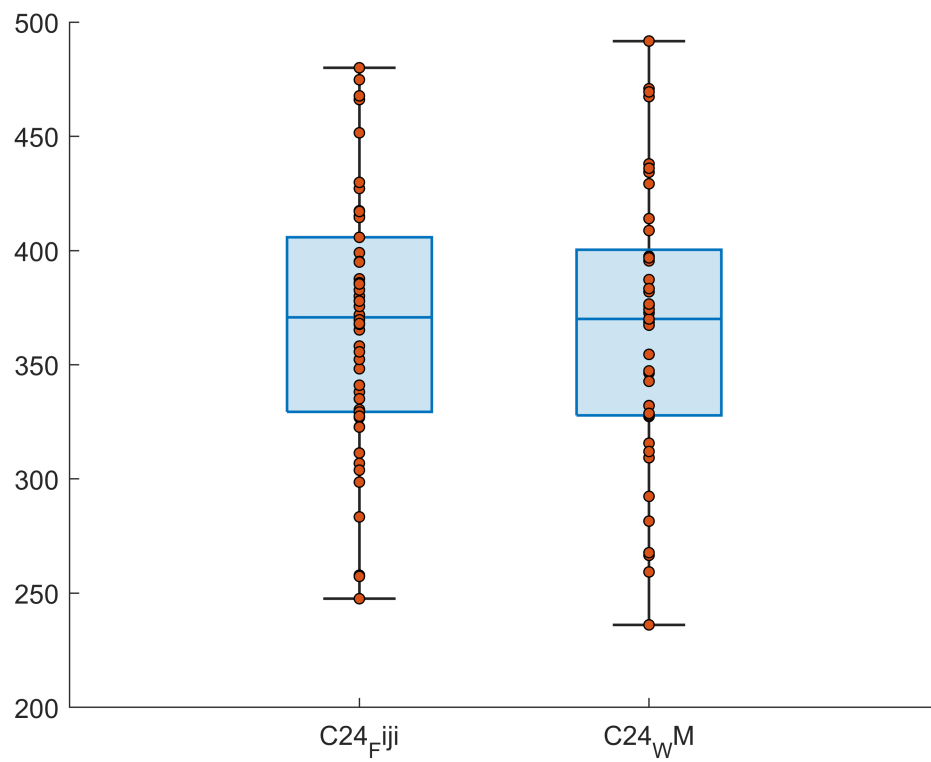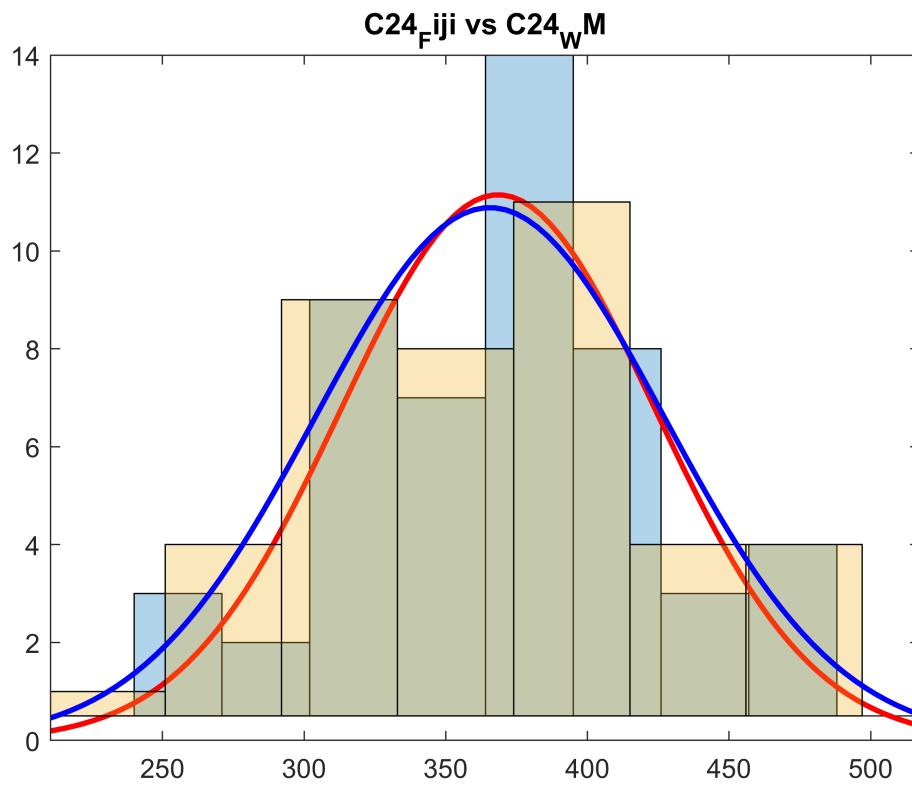
descript_dades_sing_tot = 7×2 table

|	C24_Fiji	C24_WM
1 mean	368.4857	365.5485
2 std	55.4734	61.6096
3 n	50	41
4 Std error mean	7.8451	9.6218
5 Max	480.0090	491.7160
6 Min	247.5920	236.1370
7 Range	232.4170	255.5790

C24_Fiji: Shapiro test: There is NO normality. p-val: 0.75503
C24_WM: Shapiro test: There is NO normality. p-val: 0.87855
Wilcoxon test
Wilcoxon test: Non-Reject H0: samples have same means. p-val: 0.83882

C48$_F$ji vs C48$_W$M

C48_Fiji vs C48_WM
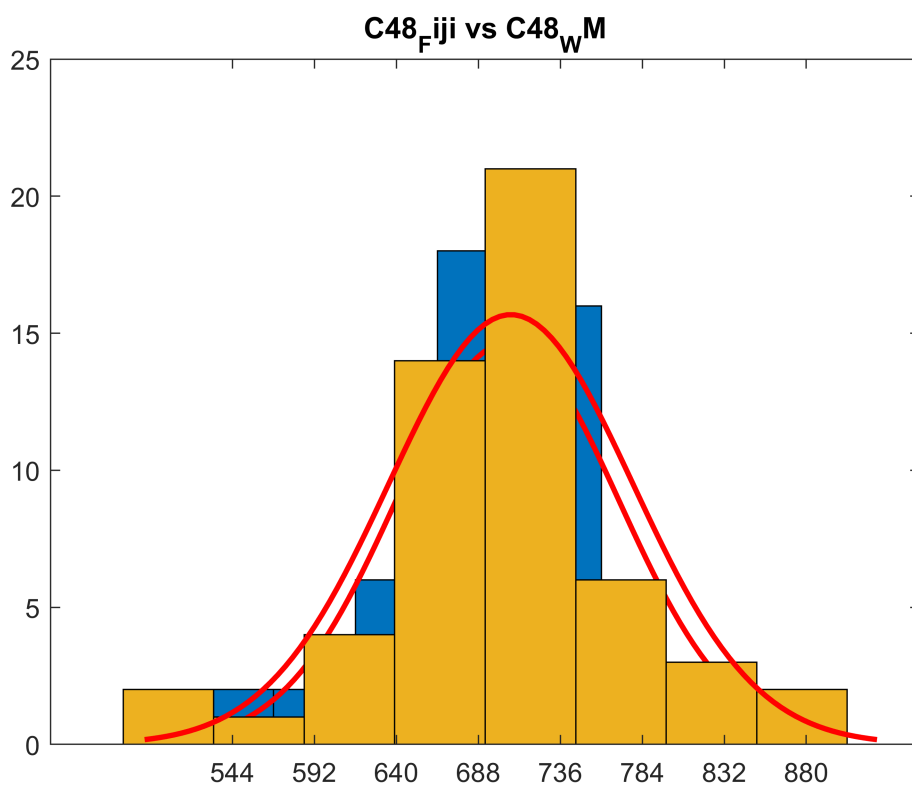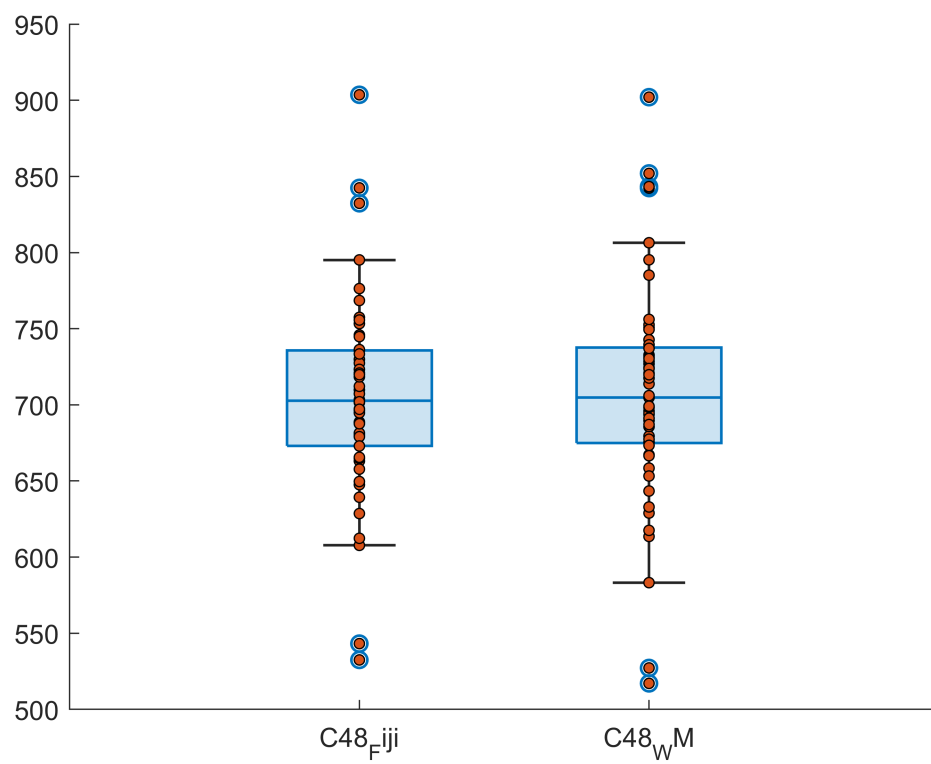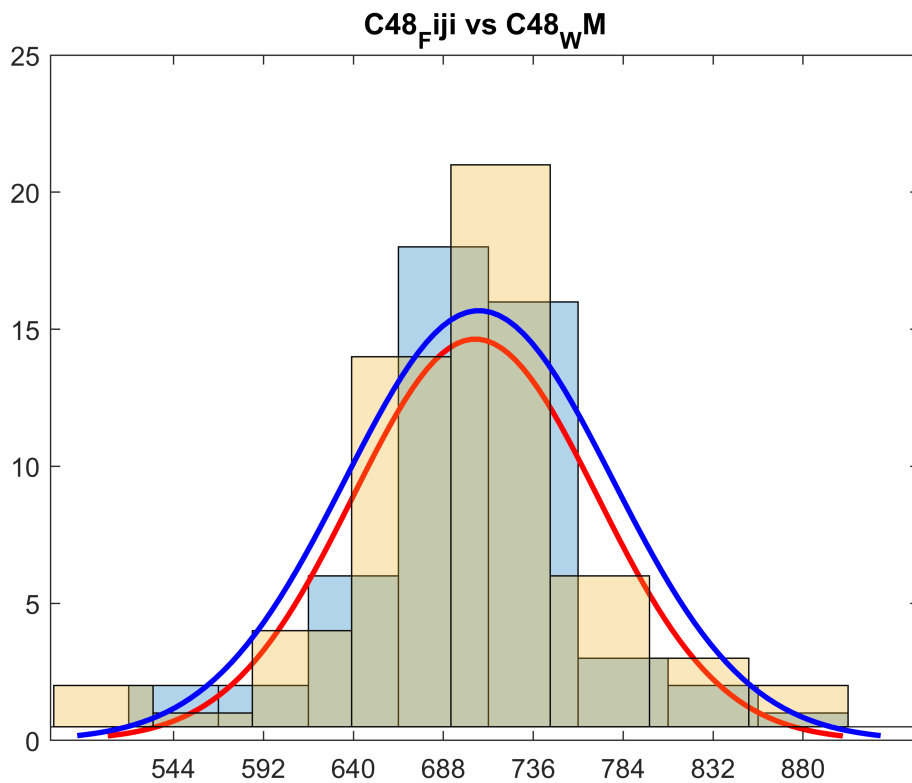
descript_dades_sing_tot = 7×2 table

|	C48_Fiji	C48_WM
1 mean	705.0531	707.0055
2 std	65.3946	71.4710
3 n	50	53
4 Std error mean	9.2482	9.8173
5 Max	903.5900	902.0240
6 Min	532.4870	517.0900
7 Range	371.1030	384.9340

C48_Fiji: Shapiro test: There is normality. p-val: 0.028553
C48_WM: Shapiro test: There is normality. p-val: 0.037411
Shapiro test
T-test: Not reject H0: samples have same means. p-val: 0.88549

C72$_F$iji vs C72$_W$M

C72$_F$iji vs C72$_W$M
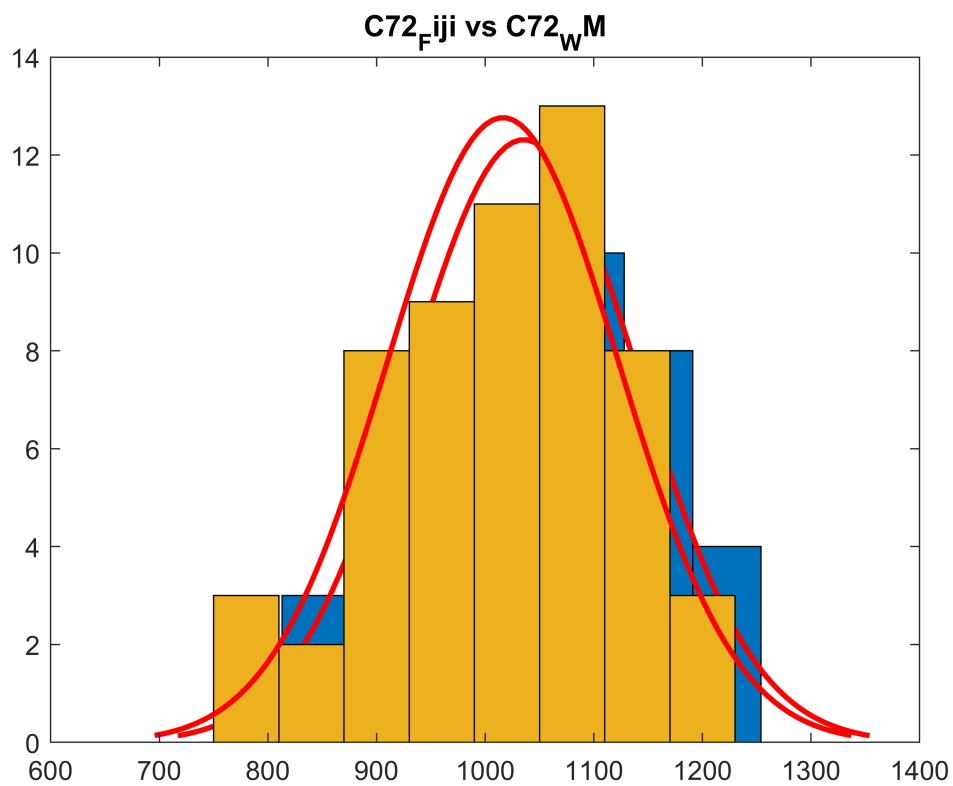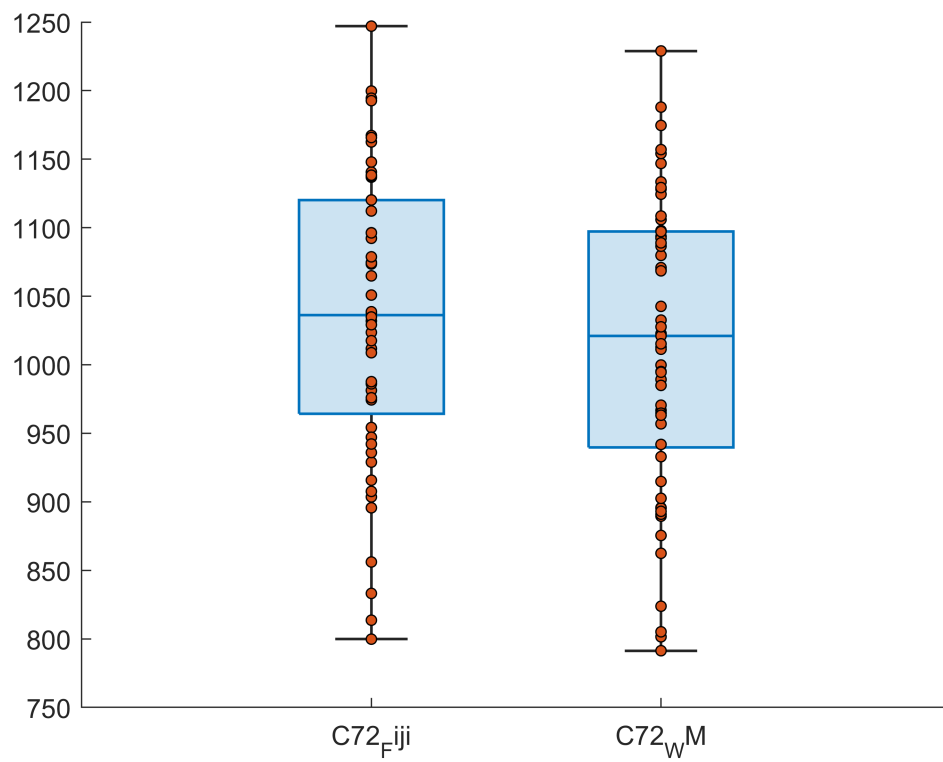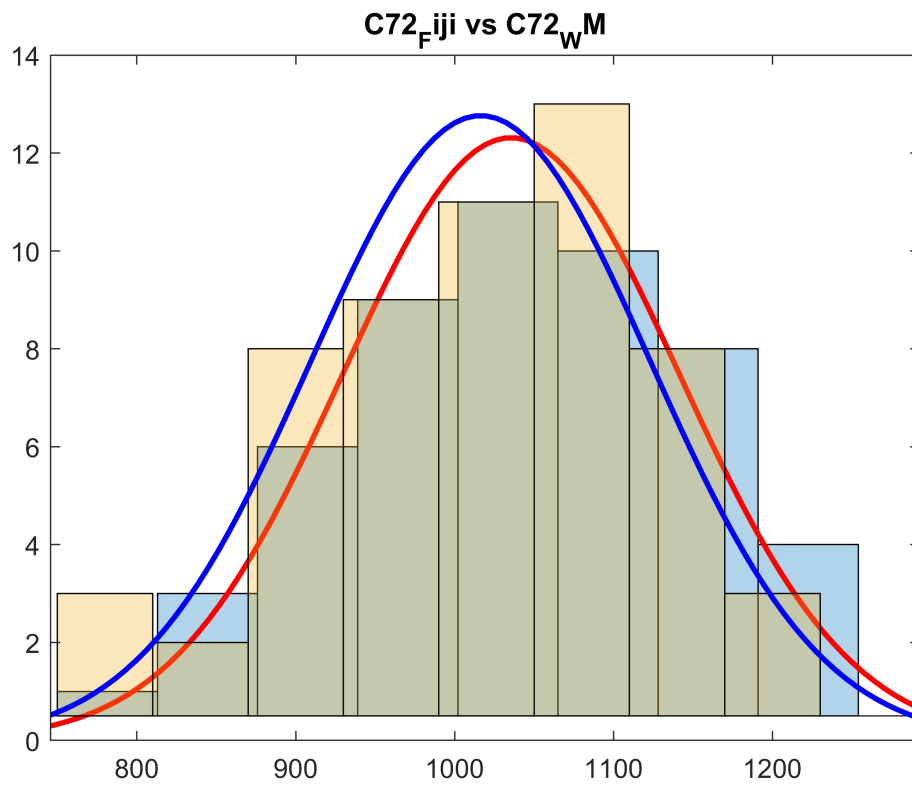
descript_dades_sing_tot = 7×2 table

	C72_Fiji	C72_WM
1 mean	1.0355e+03	1.0163e+03
2 std	106.1374	106.8892
3 n	52	57
4 Std error mean	14.7186	14.1578
5 Max	1.2471e+03	1.2290e+03
6 Min	799.7970	791.3710
7 Range	447.2610	437.5870

C72_Fiji: Shapiro test: There is NO normality. p-val: 0.67909
C72_WM: Shapiro test: There is NO normality. p-val: 0.23794
Wilcoxon test
Wilcoxon test: Non-Reject H0: samples have same means. p-val: 0.35173