

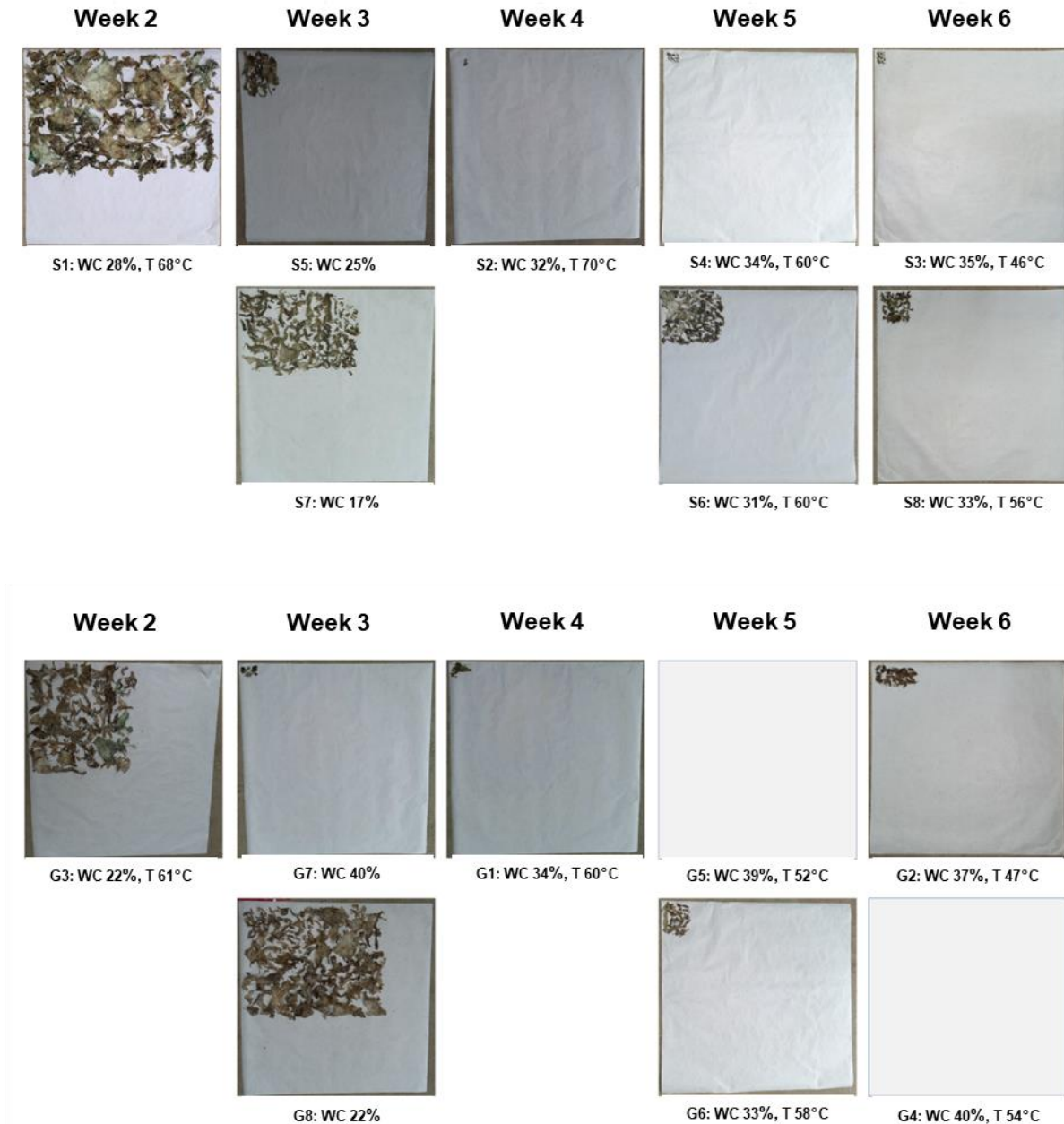
Supplementary Material

**Decomposition of biodegradable plastic bags for kitchen
waste collection in industrial composting**

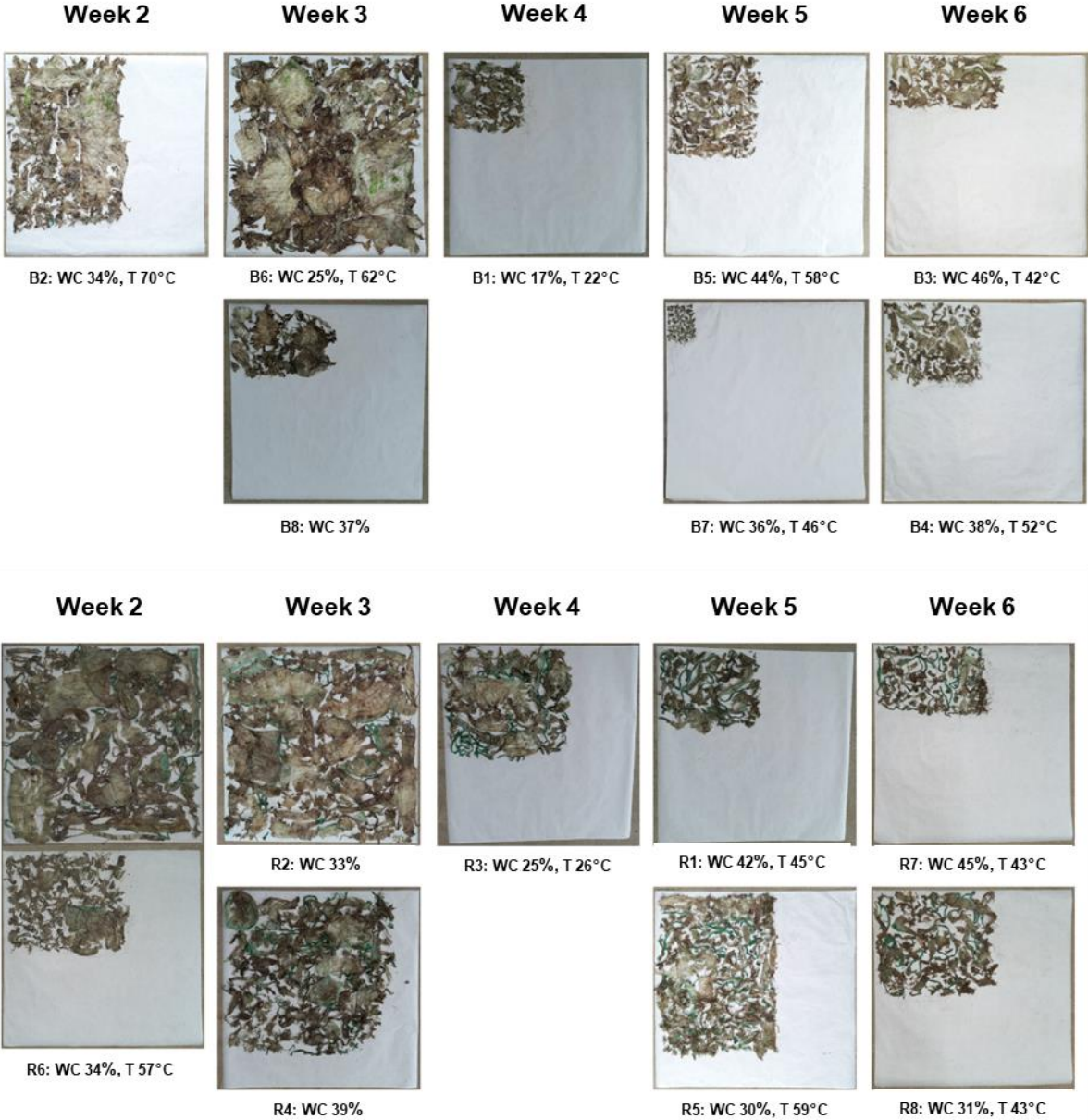
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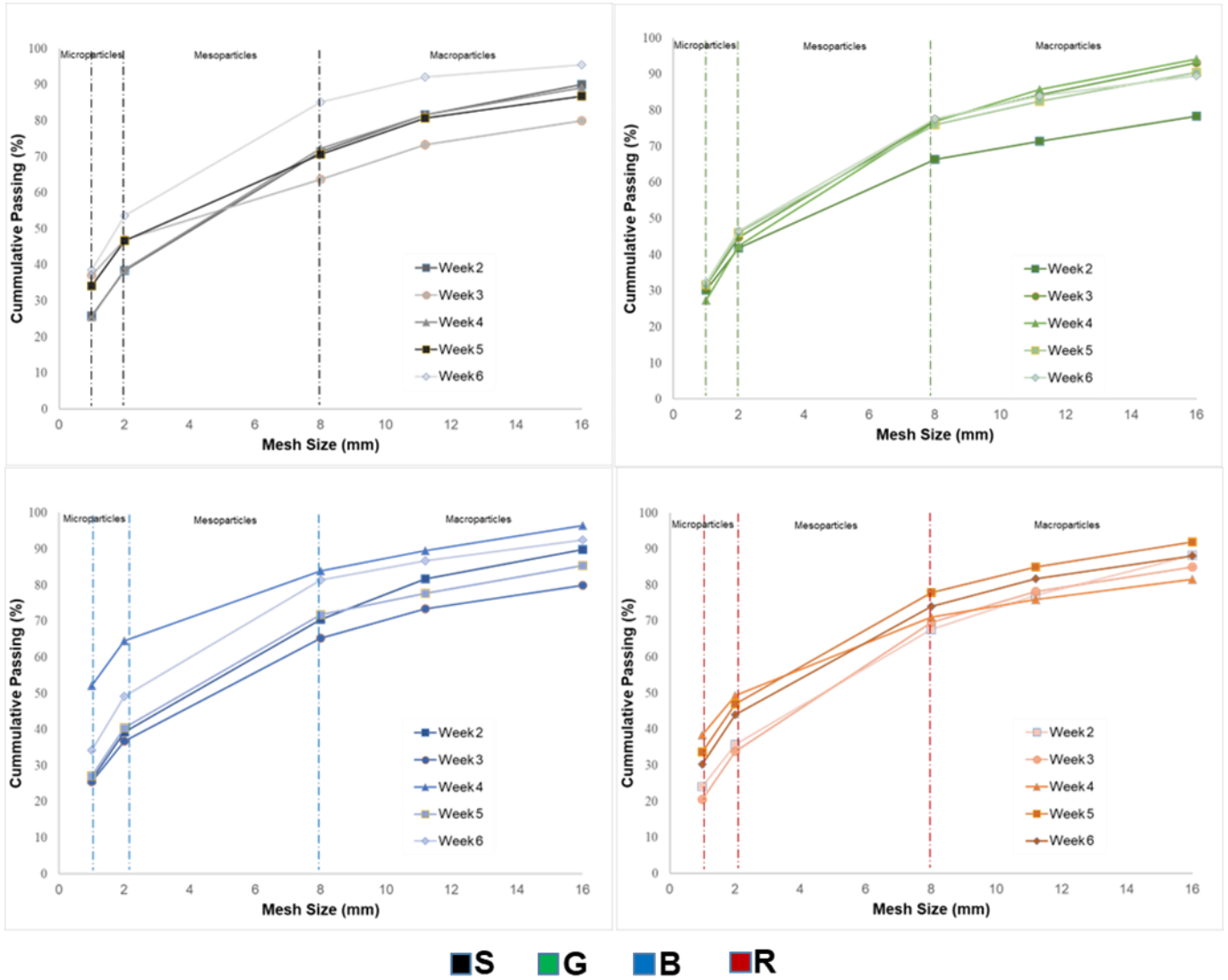
Supplementary Figure 1. Visualisation of area numbers of pre-cleaned macroparticles from TPS-blend bags after composting in nets, Including composting time, average water content in the net material, and temperature after net recovery (top: S-nets: bottom: G-nets) (based on [Deegener et al. 2022](#))



Supplementary Figure 2. Visualisation of area numbers of pre-cleaned macroparticles from PLA-blend bags after composting in nets, Including composting time, average water content in the net material, and temperature after net recovery (top: B-nets: bottom: R-nets) (based on [Deegener et al. 2022](#))



Supplementary Figure 4. Cumulative sieve passes of representative sampled rotting material from the different sampling weeks. The sieve fractions between the dotted lines were analysed for micro-respective mesoplastics (Top: Net contents with TPS-blend bags, Bottom: Net content with PLA-blend bags)



Supplementary Table 1. Characteristics of BDP bag batches and nets at the start of the experiment (Evaluation of data from [Deegener et al. 2022](#))

Bag Type	Mass of 20 bags		Density of biowaste in the bags (Kg/L)	Proportion of the filled bags in the nets		Mass of the nets (Kg/net)
	Empty (Kg/net)	Filled (Kg/net)		Mass (%)	Volume (%)	
S	0.18	36.9 ± 2.6	0.52 ± 0.04	37.0 ± 3.4	31.2 ± 1.7	99.5 ± 10.6
G	0.21	37.4 ± 3.1	0.54 ± 0.04	37.6 ± 2.1	30.7 ± 1.4	99.5 ± 9.3
B	0.22	37.5 ± 3.8	0.53 ± 0.06	39.5 ± 2.9	31.9 ± 3.2	94.9 ± 13.8
R	0.18	36.1 ± 2.3	0.51 ± 0.05	38.8 ± 2.5	31.4 ± 2.3	95.5 ± 9.4
Mean	0.20	37.0 ± 2.9	0.53 ± 0.05	38.0 ± 2.8	31.3 ± 2.2	97.4 ± 10.6

Supplementary Table 2. Composting parameter from the 14 days intensive rotting in containers (Evaluation of data from [Deegener et al. 2022](#))

		Container 1	Container 2	Container 3	Container 4	Mean
Maximum temperature	°C	76	80	76	76	77
End temperature	°C	68	76	69	68	70
Mass Loss related to initial container content	%	21.2	15.6	19.3	23.4	19.9

Supplementary Table 3. Average water content, temperature and mass loss in nets after recovery (based on [Deegener et al. 2022](#))

Week	Net	Water Content (%)	Temperature (°C)	Mass loss (%)
S - Nets				
2	S1	28.2	68	27.7
3a	S5	25.1	-	34.9
3b	S7	16.9	-	33.8
4	S2	31.8	70	22.8
5a	S4	34.2	60	18.8
5b	S6	31.0	60	31.9
6a	S3	34.5	46	25.0
6b	S8	33.2	56	19.2
G - Nets				
2	G3	22.4	61	31.4
3a	G7	39.5	-	22.5
3b	G8	21.9	-	42.8
4	G1	34.1	60	29.4
5a	G5	39.3	52	19.4
5b	G6	33.1	58	37.7
6a	G2	37.2	47	27.3
6b	G4	40.4	54	20.8
B- Nets				
2	B2	34.0	70	27.0
3a	B6	25.2	62	31.7
3b	B8	36.6	-	23.0
4	B1	17.2	22	34.1
5a	B5	44.1	58	21.9
5b	B7	36.2	46	24.0
6a	B3	45.7	42	28.4
6b	B4	37.8	52	26.5
R - Nets				
2	R6	34.4	57	22.8
3a	R2	32.9	-	30.0
3b	R4	39.2	-	22.3
4	R3	24.9	26	39.0
5a	R1	41.7	45	24.7
5b	R5	29.7	59	21.6
6a	R7	44.7	43	15.9
6b	R8	31.5	43	26.0
6b	S8	33.2	56	19.2

Supplementary Table 4. Area sum of mesoparticles (2-8mm) determined by approximation and by image processing method in relation to the content of the respective net

Week	Net	Average area of mesoparticles by approximation method (m ² /net)	Average area of mesoparticles by image processing method (m ² /net)
S - Nets			
2	S1	0.27	0.30
3a	S5	0.13	0.21
3b	S7	0.48	0.31
4	S2	0.10	0
5a	S4	0.16	0
5b	S6	1.09	0.81
6a	S3	0.15	0.14
6b	S8	0.04	0.04
G - Nets			
2	G3	0.04	0.23
3a	G7	0.22	0.10
3b	G8	0.10	0.36
4	G1	0.05	0.05
5a	G5	0	0
5b	G6	0.31	0.30
6a	G2	0.18	0
6b	G4	0.30	0
B - Nets			
2	B2	0.40	0.29
3a	B6	0.17	0.23
3b	B8	0.36	0.12
4	B1	1.35	0.22
5a	B5	0.35	0.56
5b	B7	0.23	0.10
6a	B3	0.16	0.29
6b	B4	0.11	0.20
R - Nets			
2	R6	0.14	0.06
3a	R2	0.44	0.31
3b	R4	0.46	0.85
4	R3	0.12	0.45
5a	R1	0.35	1.43
5b	R5	0.63	0.24
6a	R7	0.16	0.06
6b	R8	0.49	0.43

Supplementary Table 5. Residual mass of macro, meso and microparticles after composting.

Week	Net	Mass of original bag (g)	Macroparticles (> 8mm)				Mesoparticles (2-8 mm)	Microparticles (1-2 mm)
			Residual mass of macroparticles after manual dirt removal (g)	Residual mass of macroparticles after washing (g)	Mass loss of macroparticles by washing (%)	Remaining washed macroparticles (% initial bag mass)	Residual mass of mesoparticles (g)	Residual mass of microparticles (g)
S – Nets								
2	S1	180	118.26	114.13	3.5	63.4	5.93	0.90
3a	S5	180	4.19	2.66	36.5	1.5	2.82	0.57
3b	S7	180	37.75	31.62	16.2	17.6	10.33	1.63
4	S2	180	0.40	0.00	100.0	0.0	2.32	0.11
5a	S4	180	1.31	0.88	32.8	0.5	3.58	0.90
5b	S6	180	14.55	11.99	17.6	6.7	23.51	0.84
6a	S3	180	0.31	0.27	12.9	0.2	3.31	0.38
6b	S8	180	9.99	8.30	16.9	4.6	1.04	0.79
G – Nets								
2	G3	210	50.71	43.68	13.9	20.8	0.97	1.02
3a	G7	210	4.56	3.82	16.2	1.8	5.01	0.71
3b	G8	210	55.21	53.69	2.8	25.6	2.25	1.19
4	G1	210	0.59	0.42	18.8	0.2	1.14	1.48
5a	G5	210	0.03	0.029	3.3	0.0	0.00	0.54
5b	G6	210	4.25	3.21	24.5	1.5	7.06	0.40
6a	G2	210	3.94	2.51	36.3	1.2	4.22	2.70
6b	G4	210	0.08	0.077	3.8	0.0	6.78	2.52
B – Nets								
2	B2	220	65.17	62.32	4.4	28.3	9.65	2.20
3a	B6	220	146.19	136.5	6.6	62.0	4.29	1.10
3b	B8	220	42.68	35.61	16.6	16.2	8.85	0.37
4	B1	220	29.60	27.50	7.1	12.5	32.40	2.65
5a	B5	220	54.27	48.62	10.4	22.1	8.45	1.71
5b	B7	220	7.03	4.87	30.7	2.2	5.54	1.22
6a	B3	220	22.27	18.84	15.4	8.6	3.86	1.95
6b	B4	220	29.47	27.83	5.6	12.7	2.82	2.50
R – Nets								
2	R6	180	244.14	176.97	27.5	98.3	3.76	0.39
3a	R2	180	124.54	105.98	14.9	58.9	11.41	0.94
3b	R4	180	97.00	86.90	10.4	48.3	11.83	0.84
4	R3	180	46.53	39.81	14.4	22.1	3.18	1.58
5a	R1	180	29.22	21.80	25.4	12.1	9.01	0.39
5b	R5	180	60.34	53.62	11.1	29.8	16.11	1.49
6a	R7	180	35.86	31.43	12.4	17.5	4.15	0.97
6b	R8	180	49.56	45.98	7.2	25.5	12.68	1.97

Supplementary Table 6. Number of micro and mesoparticles as well as area sum determined by approximation method in 100 g fresh matter (FM) as well as dry matter (DM) of compost.

Week	Net	Number of microparticles (1-2 mm) / 100g compost		Number of mesoparticles (2-8 mm) / 100g compost		Area sum microparticles (1-2 mm) cm ² / 100g		Area sum mesoparticles (2-8 mm) cm ² /100g	
		FM	DM	FM	DM	FM	DM	FM	DM
S - Nets									
2	S1	18	25	11	15	0.4	0.6	2.6	3.7
3a	S5	17	23	8	10	0.4	0.5	1.9	2.5
3b	S7	40	48	23	27	0.9	1.1	5.6	6.8
4	S2	2	3	4	6	0.0	0.1	1.0	1.4
5a	S4	30	45	8	12	0.7	1.0	2.0	3.1
5b	S6	27	39	53	77	0.6	0.9	13.3	19.3
6a	S3	13	21	8	11	0.3	0.4	1.9	2.9
6b	S8	27	40	2	4	0.6	0.9	0.6	0.9
G – Nets									
2	G3	30	38	3	3	0.7	0.9	0.6	0.8
3a	G7	18	29	11	19	0.4	0.7	2.9	4.7
3b	G8	41	53	7	9	0.9	1.2	1.7	2.2
4	G1	35	53	2	4	0.8	1.2	0.6	0.9
5a	G5	16	26	0	0	0.4	0.6	0.0	0.0
5b	G6	10	15	16	24	0.2	0.3	4.0	6.0
6a	G2	92	147	13	21	2.1	3.3	3.2	5.2
6b	G4	60	100	17	29	1.3	2.3	4.3	7.2
B – Nets									
2	B2	48	72	19	28	1.1	1.6	4.7	7.1
3a	B6	33	44	12	16	0.7	1.0	2.9	3.9
3b	B8	9	15	21	33	0.2	0.3	5.3	8.3
4	B1	64	77	70	84	1.4	1.7	17.4	21.1
5a	B5	37	66	16	29	0.8	1.5	4.1	7.3
5b	B7	37	58	15	24	0.8	1.3	3.8	6.0
6a	B3	51	95	9	17	1.2	2.1	2.3	4.2
6b	B4	60	96	6	10	1.3	2.2	1.5	2.4
R – Nets									
2	R6	11	16	9	14	0.2	0.4	2.3	3.5
3a	R2	21	32	24	35	0.5	0.7	5.9	8.9
3b	R4	19	32	24	40	0.4	0.7	6.0	9.9
4	R3	31	42	6	8	0.7	0.9	1.4	1.9
5a	R1	10	18	22	38	0.2	0.4	5.6	9.5
5b	R5	35	49	34	48	0.8	1.1	8.4	12.0
6a	R7	22	39	8	15	0.5	0.9	2.1	3.8
6b	R8	39	57	23	33	0.9	1.3	5.7	8.3

