

# Data visualisation in R

Why is data visualisation important?

What is a good plot?

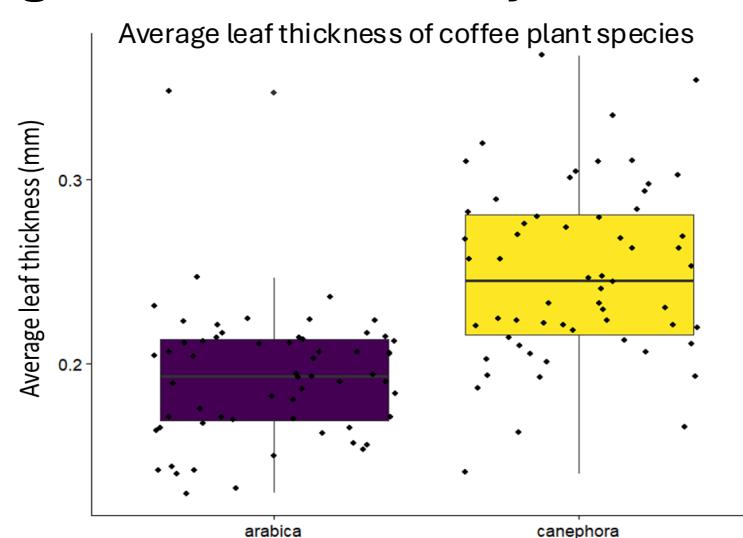
Which tools can I use?

# Why is data visualisation important?

- Goal of an experiment is to **test one or several predictions** → with plots we can answer the initial hypotheses
- Transform measurements from generic numbers to shapes
- Plots enable us to visualise **patterns** and **trends** in our data
- Plots help us **communicate** scientific findings more effectively

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Image	Median	MedianBlue	MedianGreen	MedianRed	SD Red	SD Green	SD Blue	H median	5 median	Median	Mean	S mean	V mean	Time		
1	20231127	43	86	9	49.26941	93.0762	28.23931	21.83391	25.95954	39.76556	55.05649	89.53491	0.337725	100.5383	0.69662	0.365005	1
2	20240730	131	175	2	143.746	181.385	39.11347	43.55777	55.38551	69.73103	85.46212	98.8571	0.686275	75.0505	0.784334	0.711331	2
3	20240730	132	176	2	144.46	181.354	39.15565	43.41407	31.37476	69.67956	75.17241	98.8636	0.690196	75.1096	0.784641	0.713001	3
4	20240730	132	176	2	144.477	182.122	39.20693	43.41938	31.25965	69.7268	75.17241	98.8636	0.690196	75.54275	0.784722	0.714204	4
5	20240730	133	176	2	145.829	182.178	39.56299	43.41938	31.25965	69.7268	75.17241	98.8636	0.690196	75.54433	0.782833	0.714223	5
6	20240730	133	176	2	145.8215	182.287	39.35305	43.24407	31.17446	69.92319	74.82759	98.8636	0.690196	75.54433	0.782833	0.714223	6
7	20240730	133	176	2	145.8215	182.287	39.35305	43.24407	31.17446	69.92319	74.82759	98.8636	0.690196	75.54433	0.782833	0.714223	7
8	20240730	133	177	2	145.8215	182.287	39.35305	43.24407	31.17446	69.92319	74.82759	98.8636	0.690196	75.54433	0.782833	0.714223	8
9	20240730	133	177	2	145.189	182.1043	39.59371	43.30094	31.05708	70.17867	70.17867	98.8701	0.691118	75.63238	0.783053	0.715703	9
10	20240730	133	177	2	145.4439	182.1687	39.57343	43.30812	31.07079	70.18511	70.18511	98.8701	0.691118	75.85997	0.78336	0.716348	9
11	20240730	132	177	2	144.525	182.0317	39.42302	43.3416	31.03018	70.07063	75.42857	98.8701	0.691118	76.05206	0.784472	0.717300	10
12	20240730	134	177	2	145.289	182.8899	39.43154	43.26797	31.03465	70.08337	74.74286	98.8701	0.691118	75.84045	0.784399	0.717215	11
13	20240730	133	177	2	145.356	182.8926	39.28973	43.33997	31.06151	70.10831	75.08571	98.8701	0.691118	75.86262	0.785282	0.717579	12
14	20240730	132	177	2	145.2722	183.0303	39.03345	43.24407	31.17446	69.92319	74.82759	98.8636	0.690196	75.77911	0.786001	0.71801	13
15	20240730	133	177	2	145.2722	183.0303	39.03345	43.24407	31.17446	69.92319	74.82759	98.8636	0.690196	75.77911	0.786001	0.71801	14
16	20240730	132	177	2	144.164	182.7637	38.85655	43.61793	31.23992	70.02438	75.42857	98.8701	0.691118	76.03006	0.787395	0.716721	15
17	20240730	132	177	2	144.2841	182.793	38.85655	43.61793	31.23992	70.02438	75.42857	98.8701	0.691118	76.01946	0.788091	0.716585	16
18	20240730	133	177	2	144.3114	182.6233	38.85938	43.65261	31.26642	70.05304	75.08571	98.8701	0.691118	75.72852	0.787352	0.716167	17
19	20240730	132	177	2	144.444	182.7743	38.71276	43.68988	31.23783	69.92882	75.42857	98.8701	0.691118	75.84616	0.788198	0.716762	18
20	20240730	133	177	2	144.5994	182.7966	38.85198	43.61844	31.19862	70.0233	75.08571	98.8701	0.691118	75.79450	0.787458	0.716849	19
21	20240730	133	177	2	144.5994	182.7966	38.85198	43.61844	31.19862	70.0233	75.08571	98.8701	0.691118	75.79450	0.787458	0.717137	20
22	20240730	133	177	2	144.592	182.4421	38.86454	43.56881	31.1222	69.9371	75.08571	98.8701	0.691118	75.85931	0.788001	0.717137	21
23	20240730	132	177	2	145.0022	183.094	38.83312	43.55252	31.11543	69.95932	75.08571	98.8701	0.691118	75.84286	0.787906	0.718016	22
24	20240730	133	177	2	145.2235	183.0937	38.97364	43.54603	31.05951	70.02111	75.08571	98.8701	0.691118	75.56607	0.787380	0.718014	23
25	20240730	133	177	2	145.1511	183.7119	38.95108	43.56398	31.09824	70.06402	75.08571	98.8701	0.691118	75.83273	0.787321	0.718321	24
26	20240730	132	177	2	145.2098	183.7126	39.06955	43.53137	31.09231	70.18366	75.08571	98.8701	0.691118	75.80652	0.786760	0.718324	25
27	20240730	133	177	2	145.0844	183.207	39.09465	43.54586	31.09194	70.21795	75.08571	98.8701	0.691118	75.87201	0.786609	0.718459	26
28	20240730	133	177	2	145.0872	183.207	39.09465	43.54586	31.09194	70.21795	75.08571	98.8701	0.691118	75.87201	0.786609	0.718459	27
29	20240730	132	177	2	144.872	183.207	39.04710	43.56005	31.08939	70.20418	75.42857	98.8701	0.691118	75.89319	0.787002	0.718909	28
30	20240730	132	177	2	144.977	183.5542	38.91243	43.57366	31.08278	70.09445	75.42857	98.8701	0.691118	75.94516	0.787775	0.719036	29
31	20240730	134	177	2	145.7774	183.4439	39.00947	43.50585	31.09409	70.18018	74.74286	98.8701	0.691118	75.54407	0.787117	0.718609	30
32	20240730	134	177	2	146.166	183.285	39.05952	43.50339	31.08138	70.25745	74.74286	98.8701	0.691118	75.28485	0.786863	0.718543	31
33	20240730	133	177	2	146.949	183.7374	38.95448	43.54549	31.07331	70.1799	75.08571	98.8701	0.691118	75.38691	0.787569	0.719111	32
34	20240730	133	177	2	145.7276	183.357	38.98164	43.55946	31.05951	70.1799	75.08571	98.8701	0.691118	75.38691	0.787569	0.719047	33
35	20240730	132	178	2	145.7276	183.357	38.98164	43.55946	31.05951	70.1799	75.08571	98.8701	0.691118	75.38691	0.787569	0.719047	34
36	20240730	132	178	2	145.7311	183.1113	39.36338	43.55261	31.05667	75.65181	75.65181	98.8701	0.691118	75.38691	0.787569	0.719047	35
37	20240730	133	178	2	145.1505	183.4272	39.24451	43.50697	31.05667	70.42755	75.34091	98.8701	0.691118	75.42220	0.786102	0.719501	36
38	20240730	133	178	2	145.858	183.5366	39.04354	43.54558	31.02912	70.35957	75.34091	98.8701	0.691118	75.68877	0.787707	0.719955	37
39	20240730	134	178	2	145.859	183.5366	39.04354	43.51513	31.02912	70.35957	75.34091	98.8701	0.691118	75.65756	0.786662	0.719752	38
40	20240730	132	178	2	144.9968	183.5595	39.25107	43.55946	31.0247	70.30374	75.68182	98.8701	0.691118	76.08628	0.787222	0.720234	39
41	20240730	134	178	2	145.5252	183.744	39.25107	43.50975	31.03097	70.4332	75.34091	98.8701	0.691118	75.85330	0.786933	0.719827	40
42	20240730	132	178	2	146.144	183.5595	39.25107	43.49853	31.02843	70.4332	75.34091	98.8701	0.691118	75.63940	0.786512	0.719827	41
43	20240730	134	178	2	145.4972	183.5882	39.44479	43.50964	31.02494	70.83854	75.34091	98.8701	0.691118	75.63940	0.786512	0.719827	42
44	20240730	133	178	2	145.0444	183.7116	39.02853	43.56471	31.00815	70.30458	75.34091	98.8701	0.691118	75.65332	0.787662	0.720073	43

Practicals: Data visualisation in R

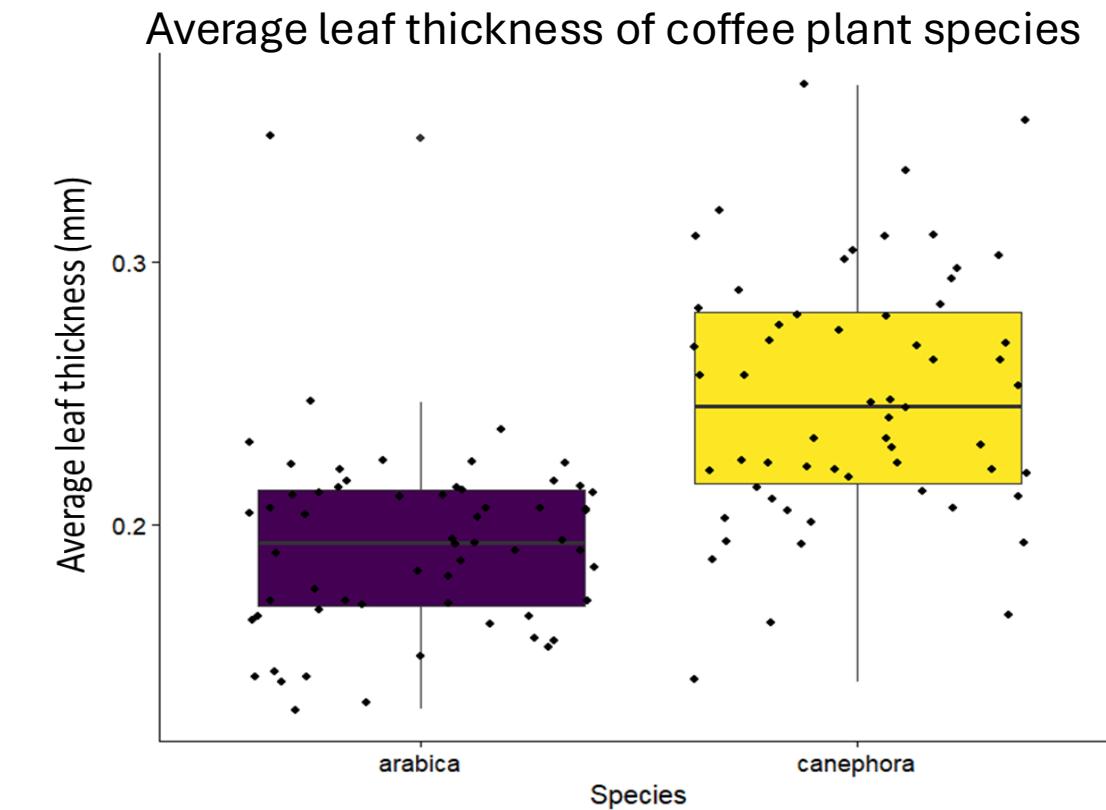


# What is a good plot?

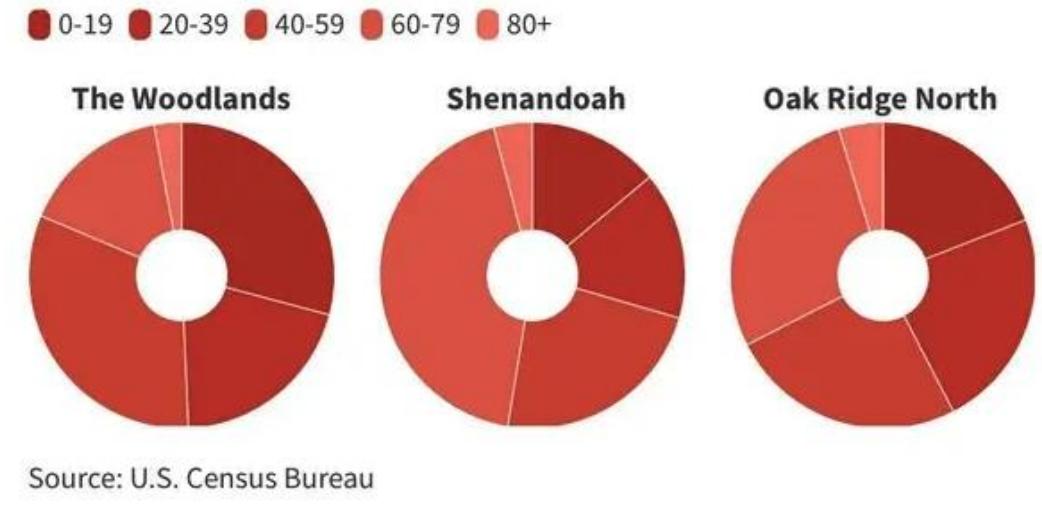
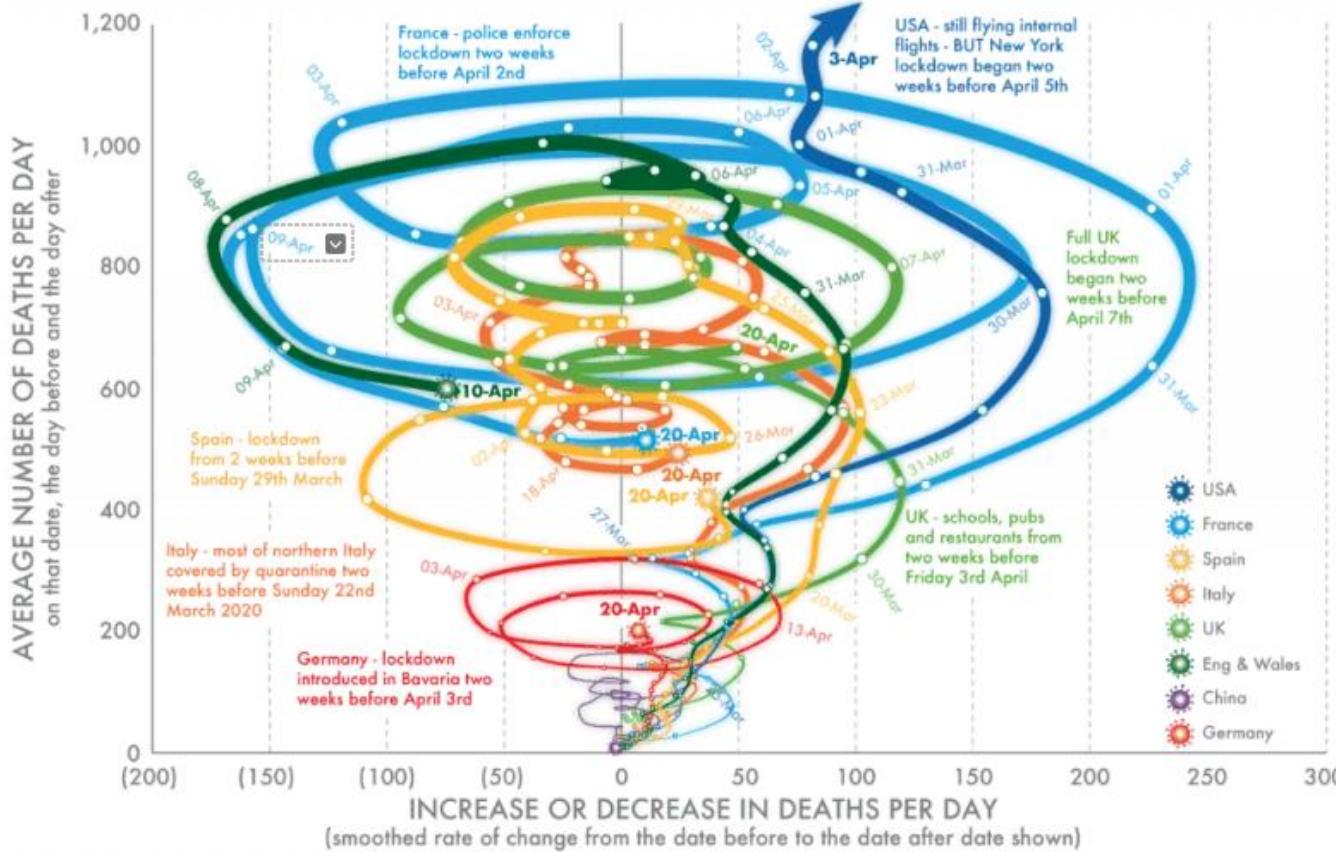
- Conveys relevant information
- Easy to understand
- Clear and visible
- Includes titles, legends, and units
- Use contrasting colours

Check these out

- <https://colors.co/palettes/popular>
- <https://hclwizard.org>
- <https://www.datanovia.com/en/blog/the-a-z-of-rcolorbrewer-palette/>
- <https://bpb-us-e1.wpmucdn.com/sites.ucsc.edu/dist/d/276/files/2015/10/colorbynams.png?bid=276>



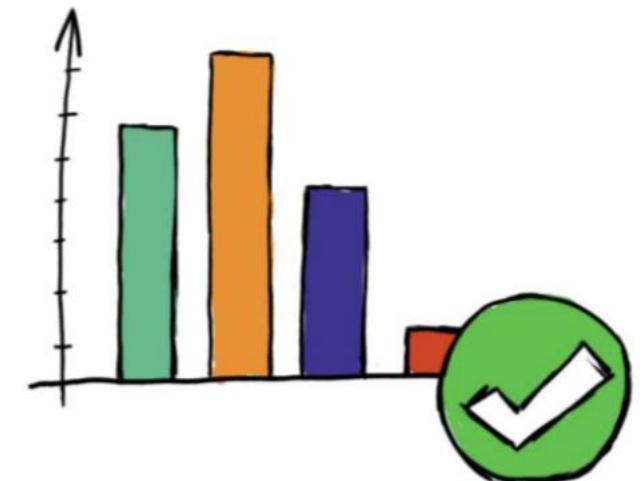
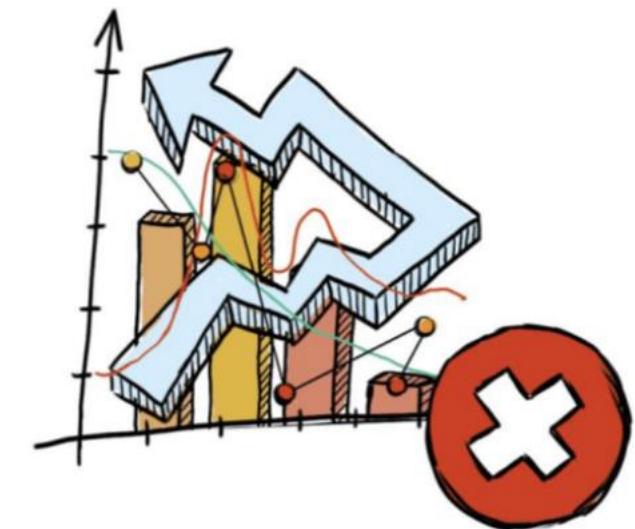
# Examples of bad plots



# What is a good plot?

To create a good plot:

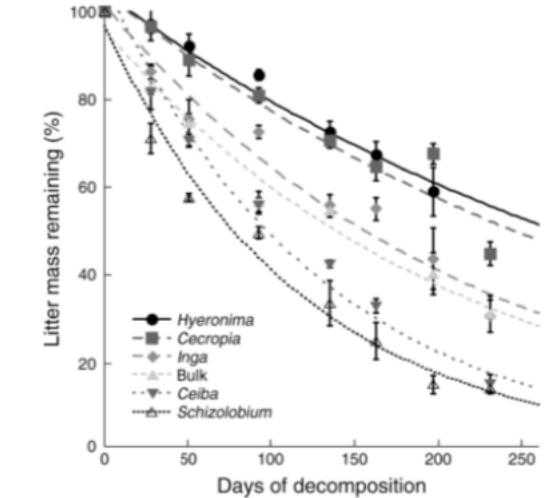
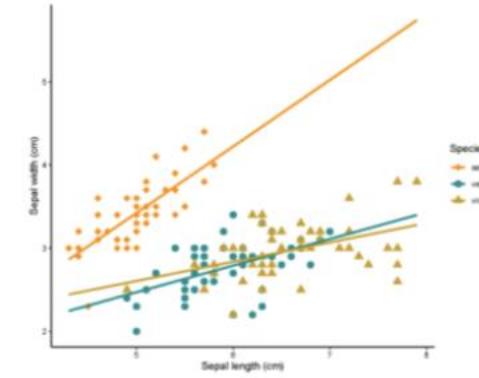
- Think about your hypotheses: what do you want to show?  
→ **Relevance** is important!
- Think about your experimental design: what type of variables do you have?  
→ Choose the right type of plot



# How to choose the appropriate plot?

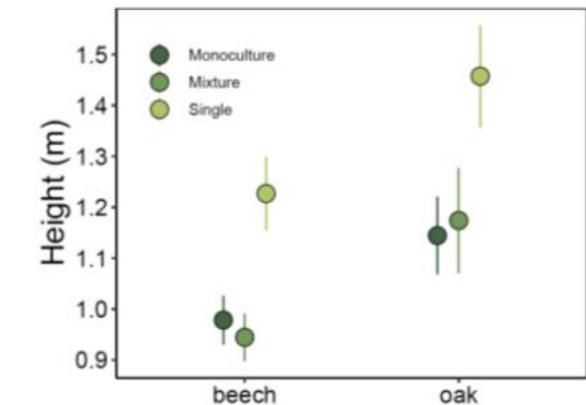
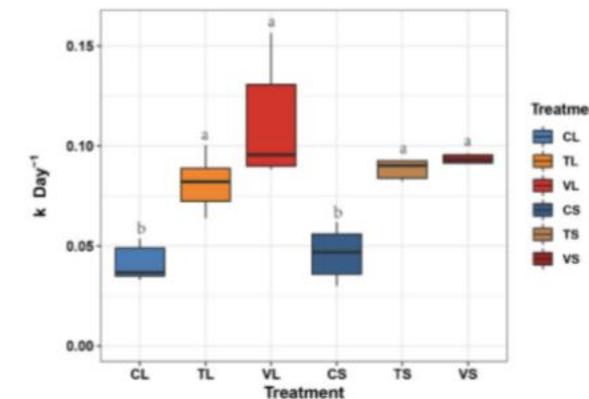
- Relationships: scatter plots, line plots

- Continuous variables
- Evolution over time



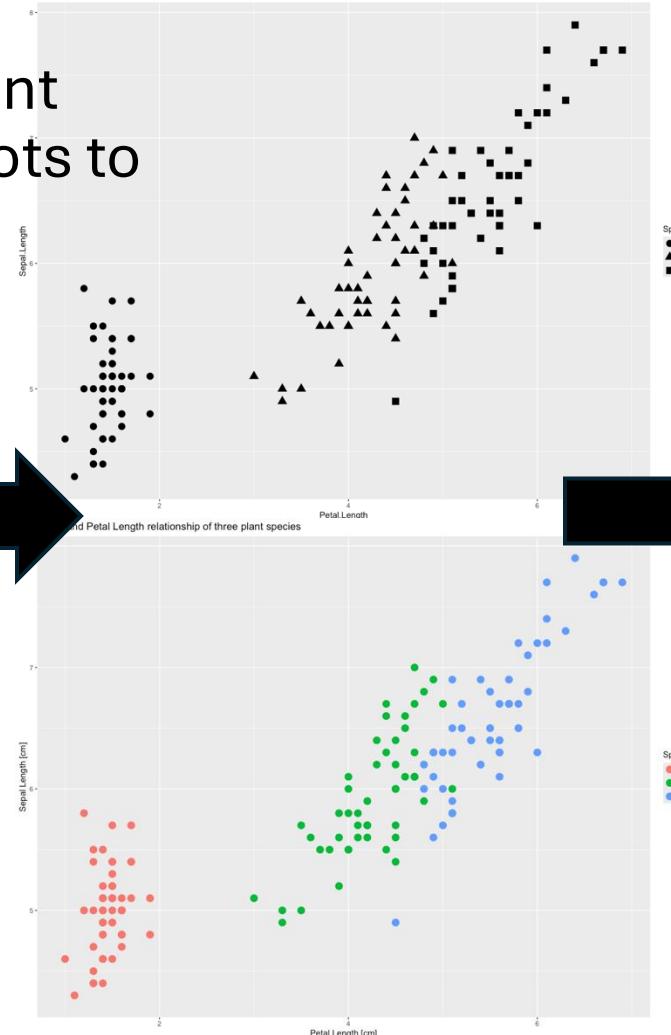
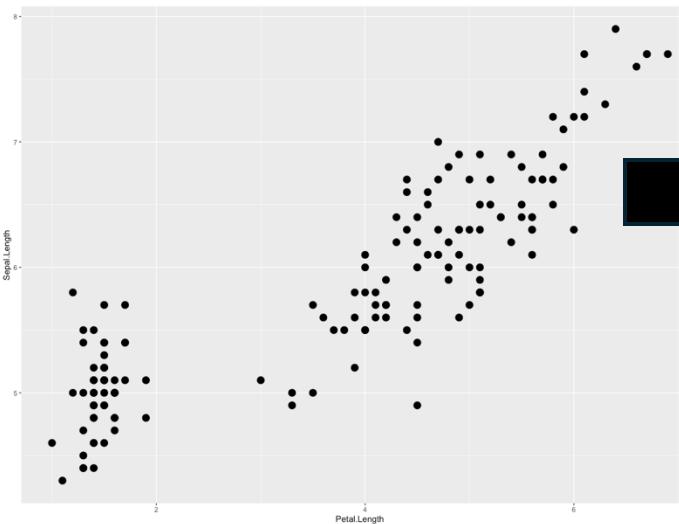
- Comparisons: box plots, bar plots, point plots

- Categorical variables
- Differences between groups

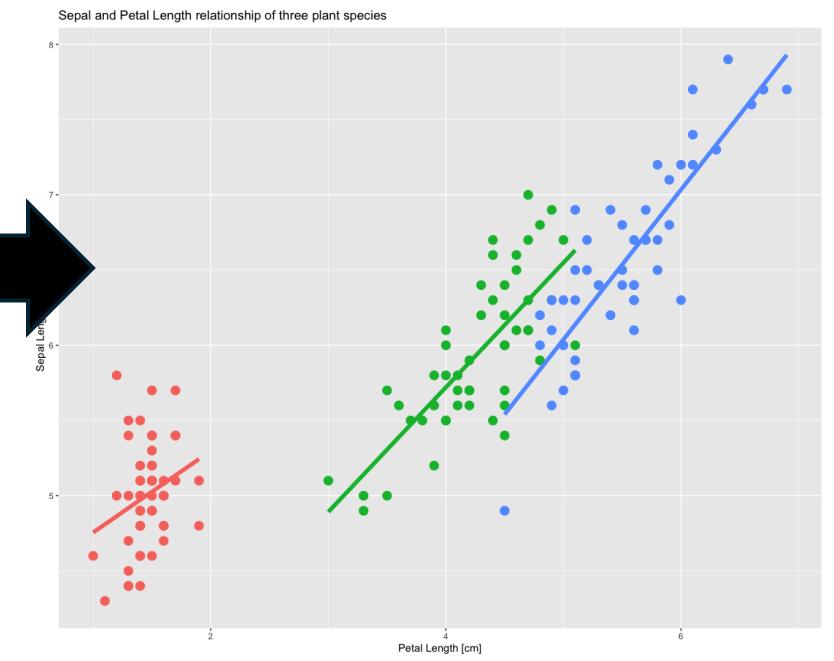


# Choice of final plot

Explore your data, try different colours, shapes, types of plots to discover potential trends



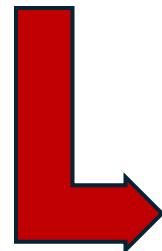
Final plot is obtained through trial and error!



# Which tools can I use?



- In R, there are mainly two options to plot your data:
  - base R: built-in function that allow you to create different plots, easy to use for basic graphs
  - ggplot: R-package including a large variety of plots and esthetics (colours, shapes, facets,...)



Today we will mainly  
be using ggplot!

# Which tools can I use?



- Check the material on moodle:
  - Visualisation in R: examples of codes to create plots
  - Cheat Sheets: summaries of command for base R and ggplot
  - Visualisation tasks: small tasks for training
  - Your own data: you can already importing it on r and start exploring