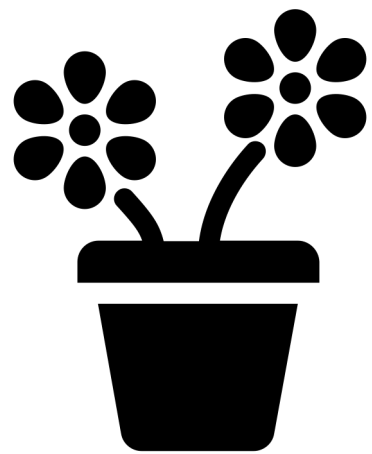
Let’s revisit Experimental Design!

Kanan Saikai



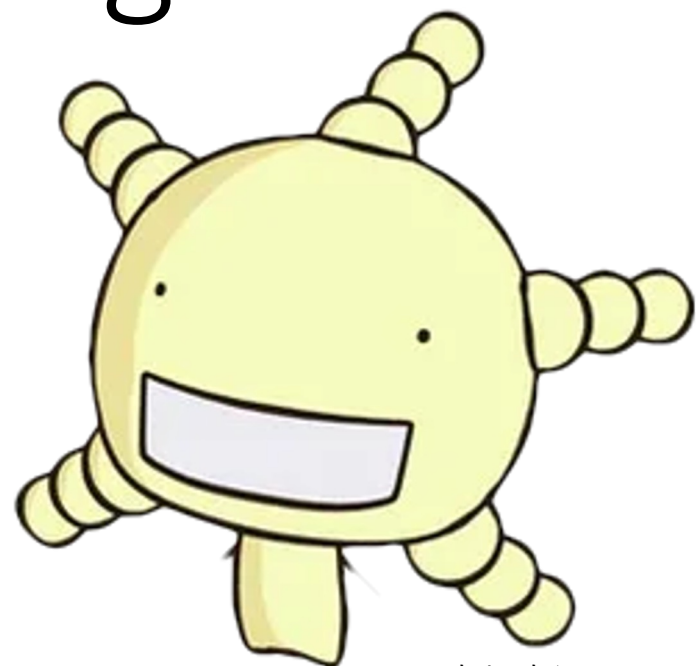
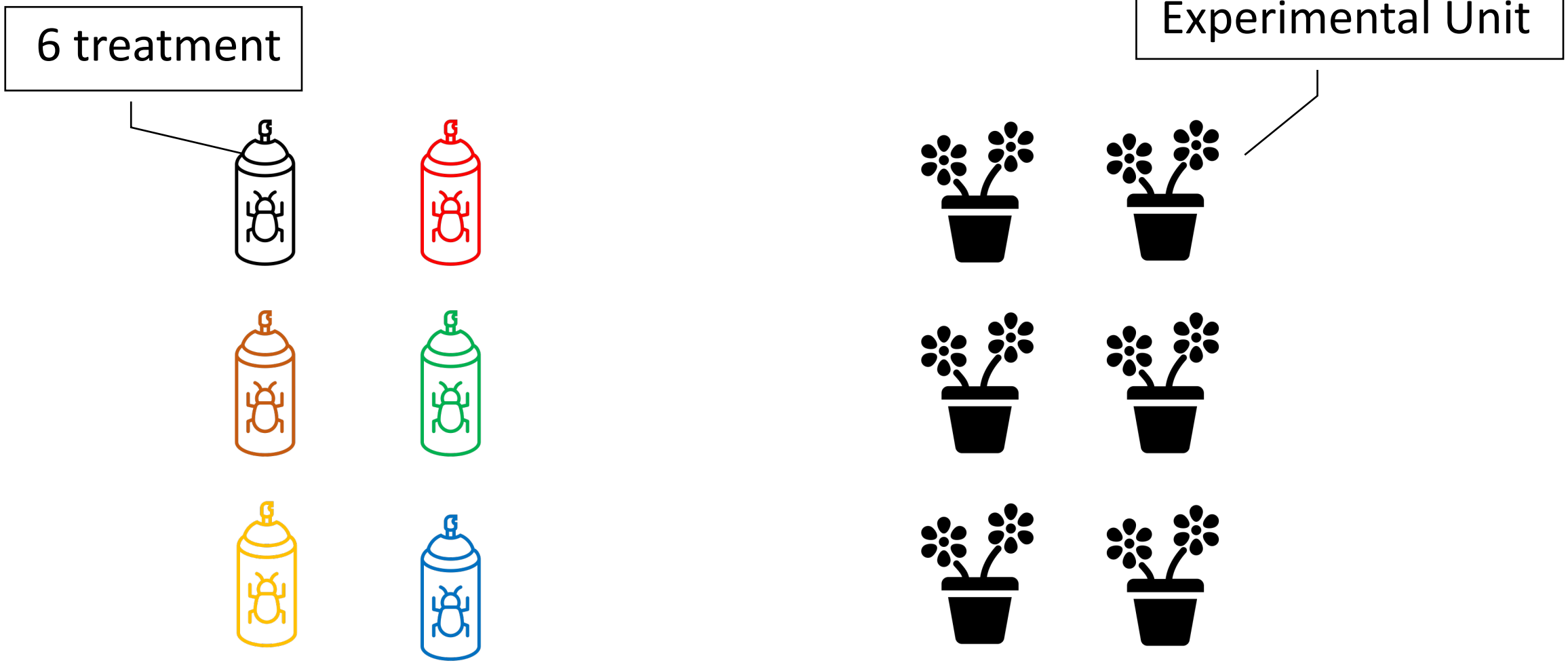


Image by もやしもん

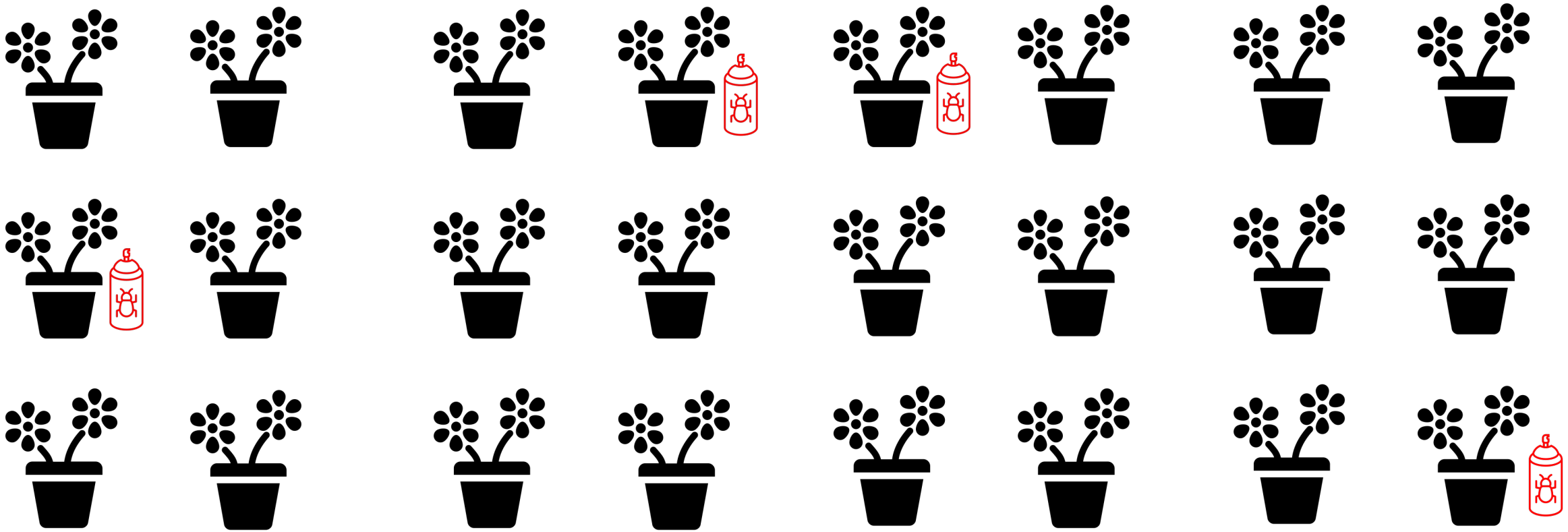
Don’t get confused with…

“Randomization”



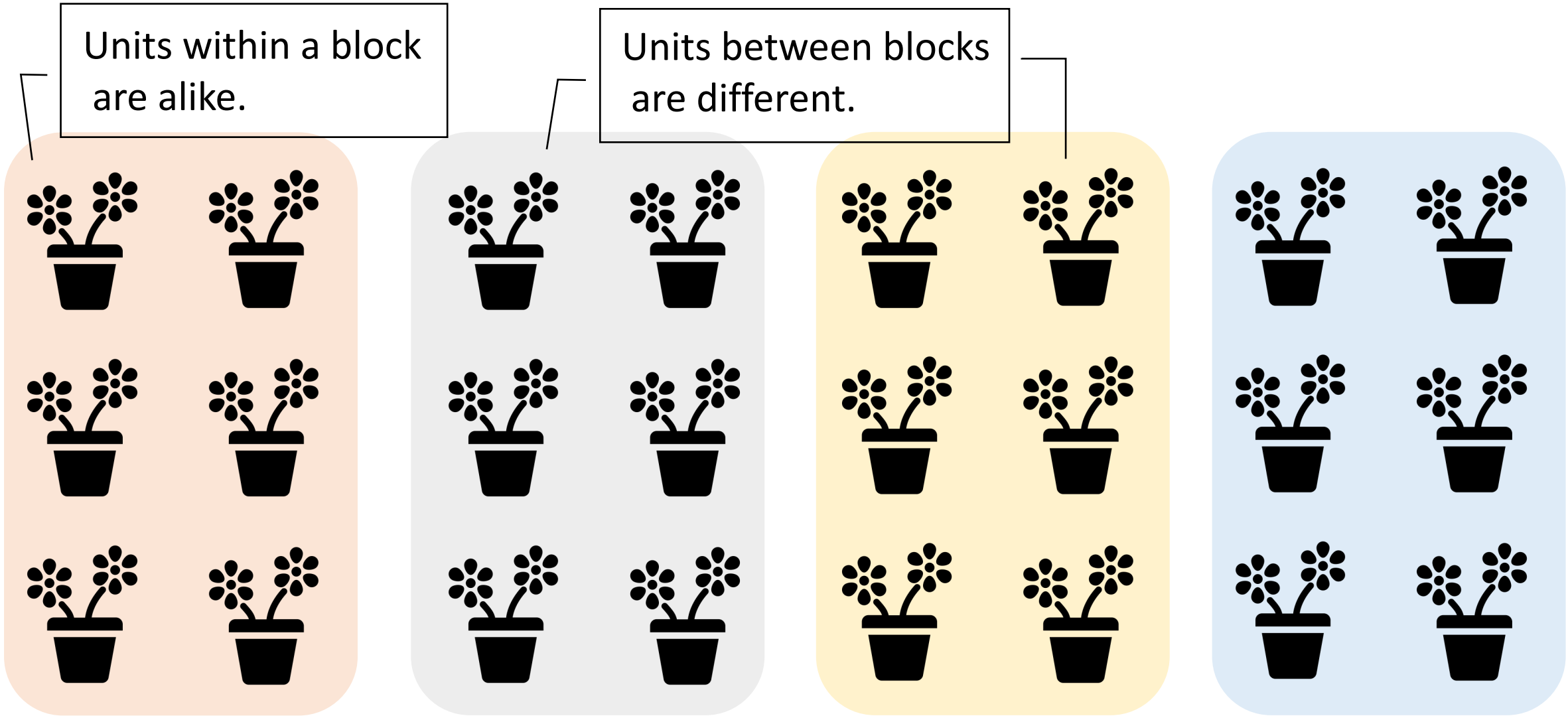
Don’t get confused with…

“Replication” to obtain an estimate of error variation



Don’t get confused with…

“Blocking” = reduces unexpected error



Don’t get confused with…

“Repetition” = increase precision and confidence.

Year 1

Site A

Site B

Year 2

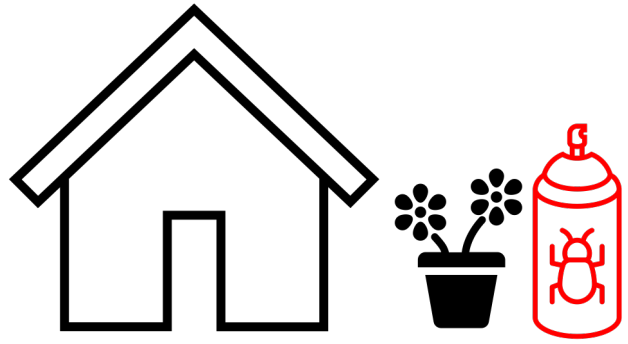
Site A

Site B

Year 3

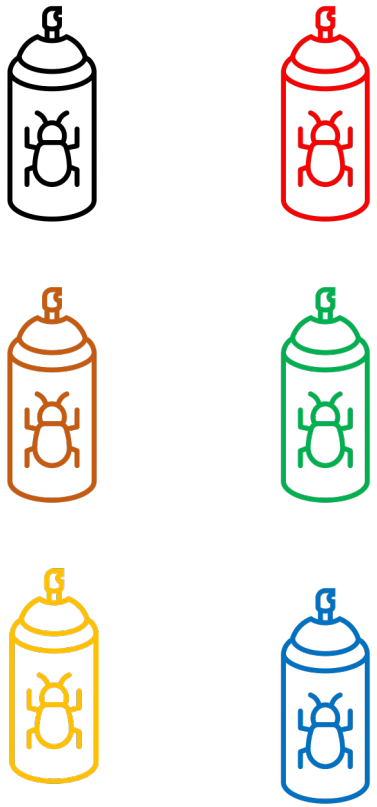
Site A

Site B



What is **Complete Randomized Design (CRD)**

Treatments = 6



×

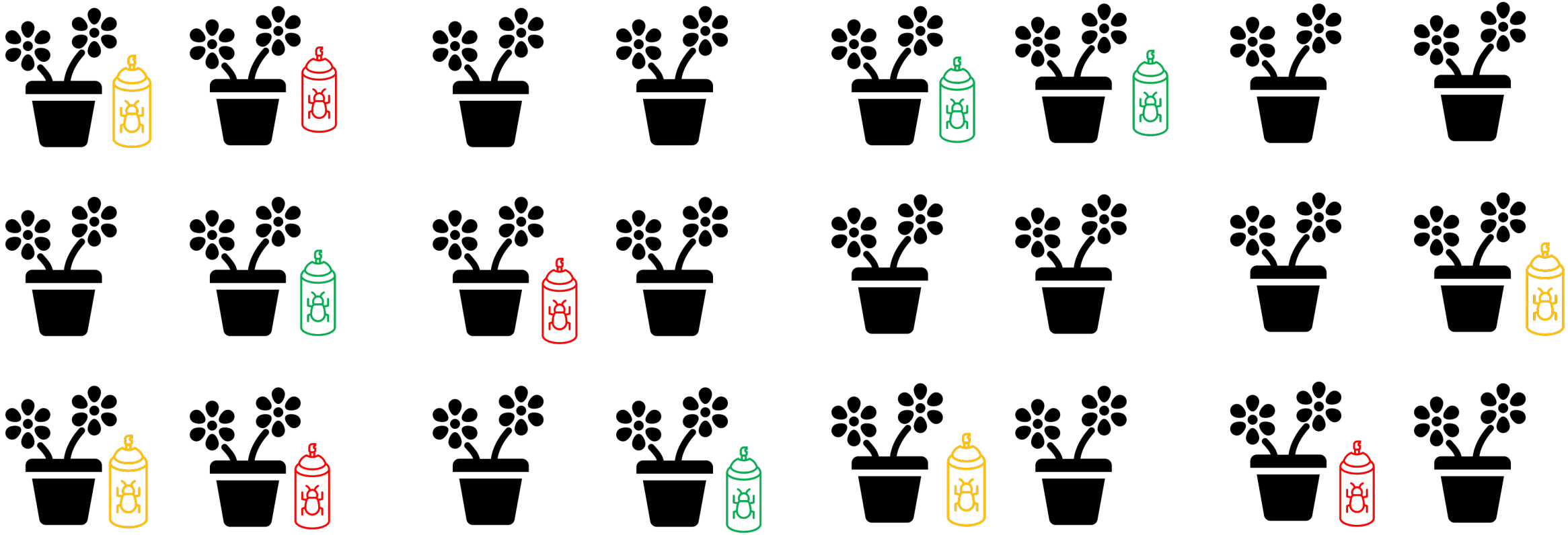
4 replications

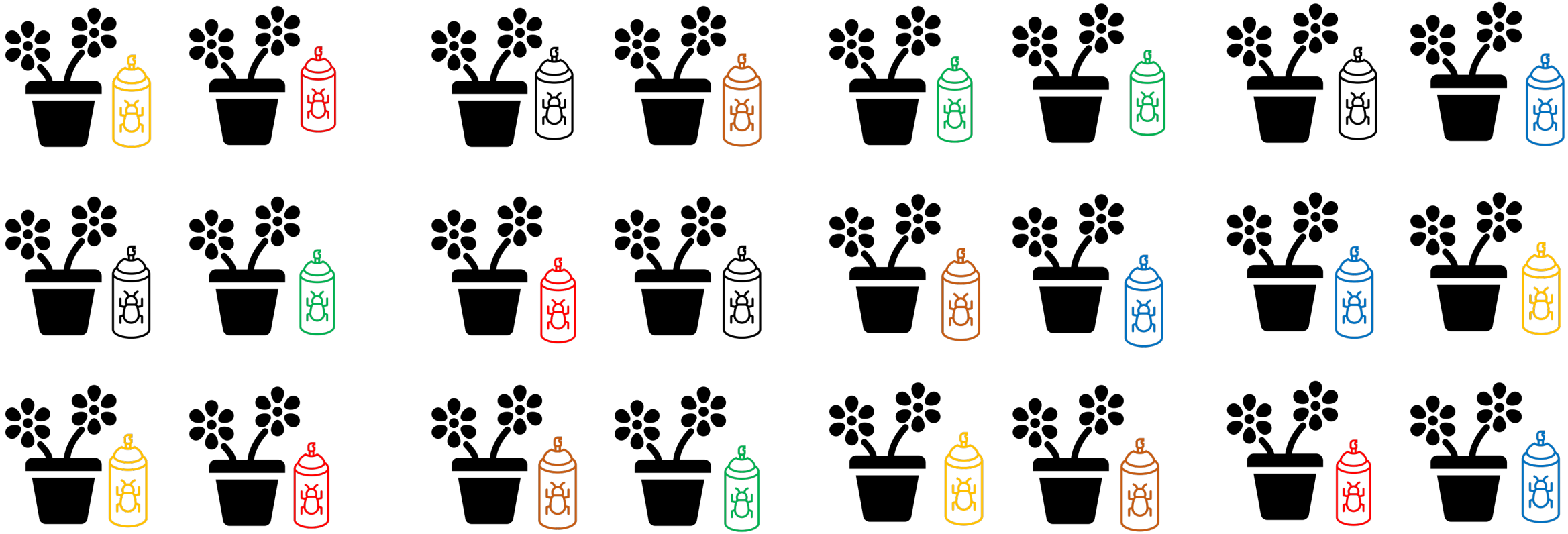
=

24 EU

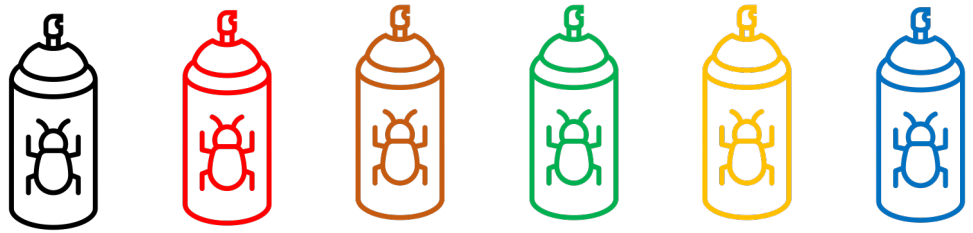
Treatment assignment

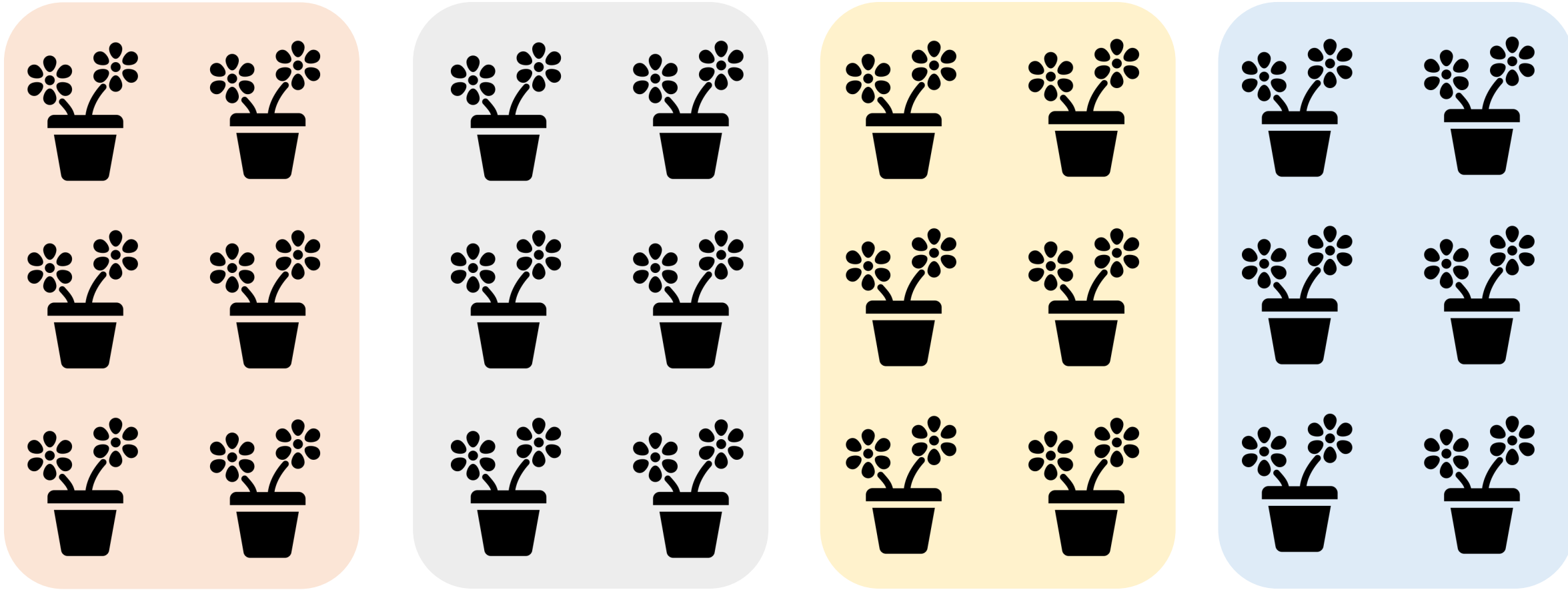
ALL RANDOMIZED

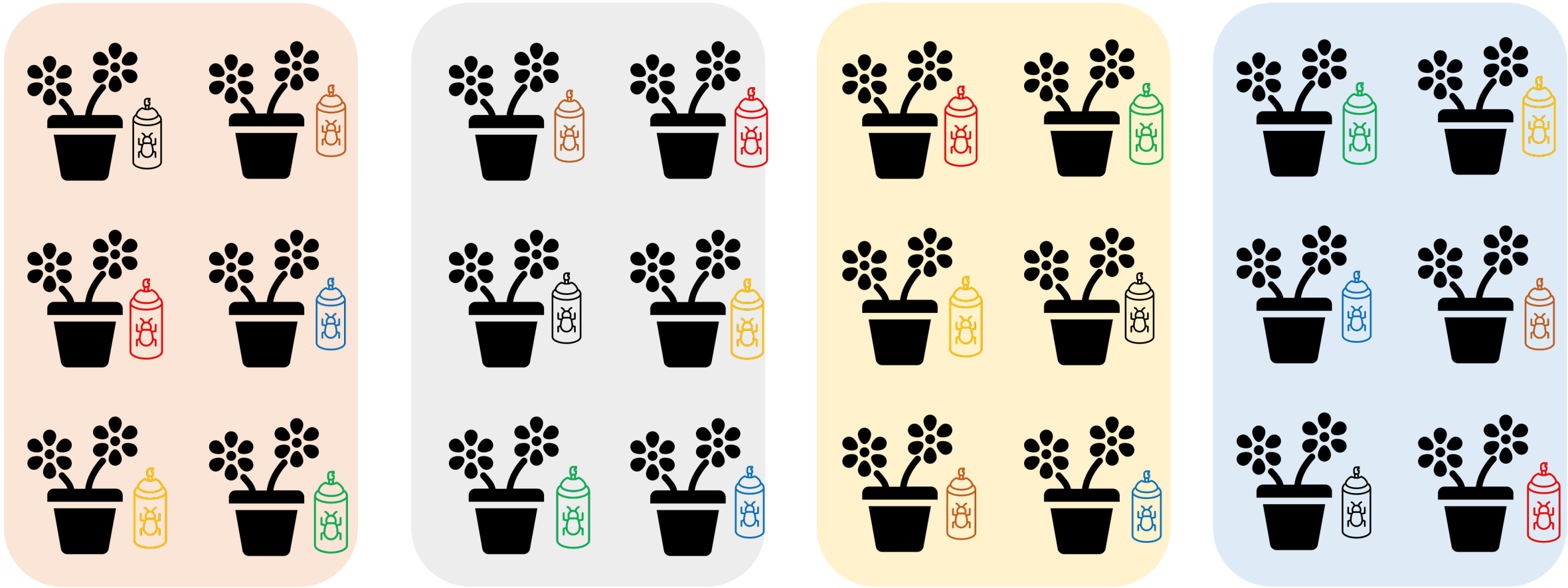




What is **Randomized Complete Block Design (RCBD)**

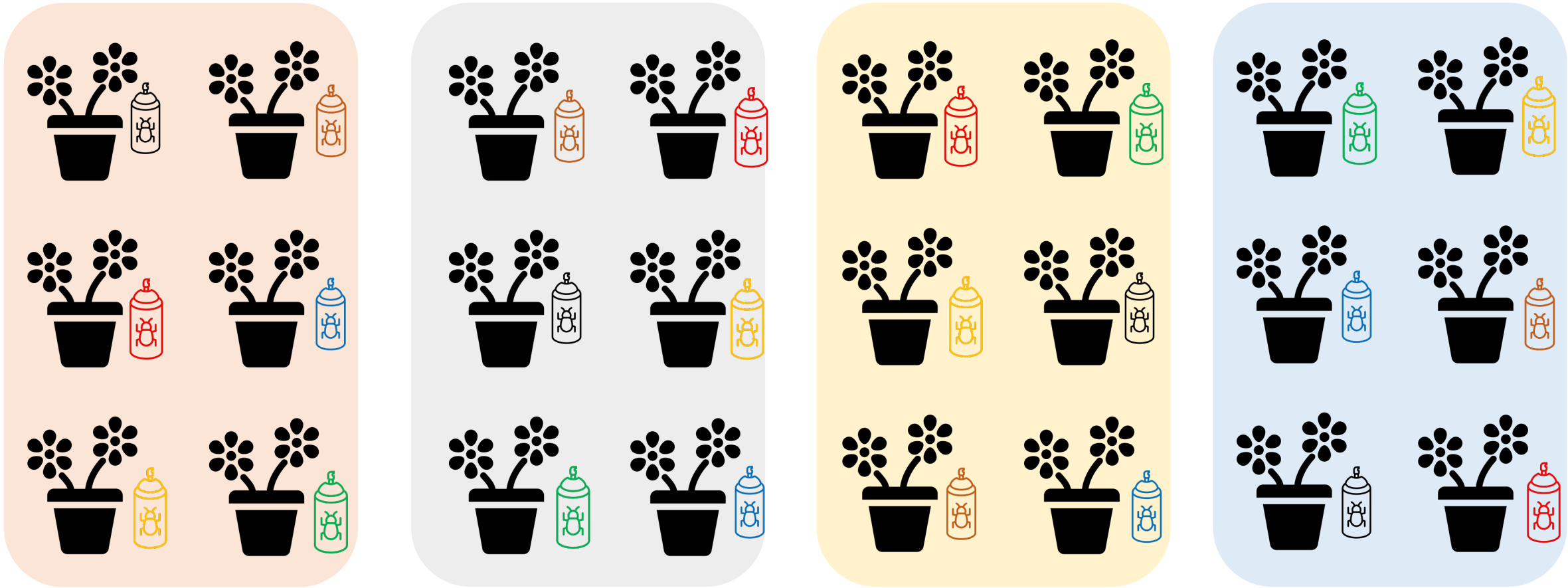






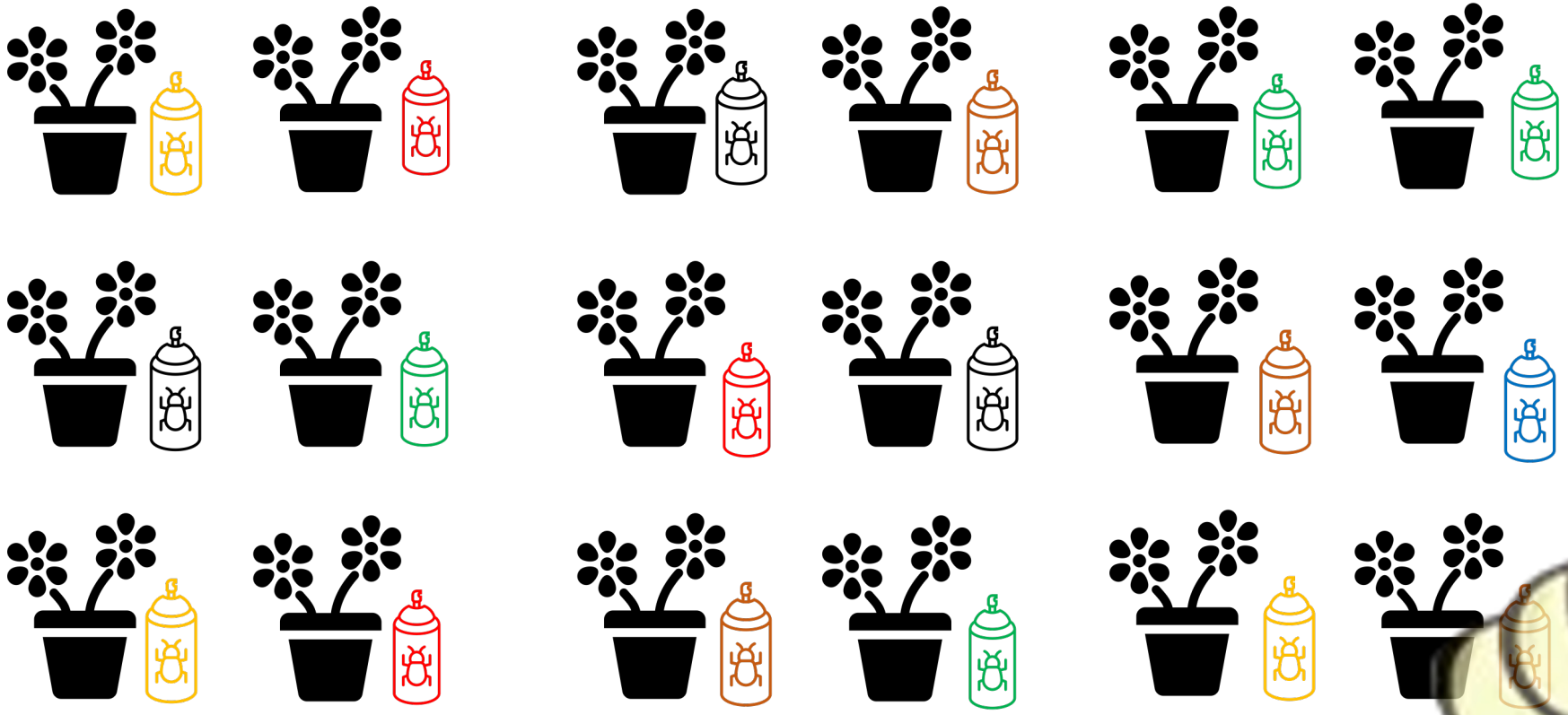
Units within a block are alike.

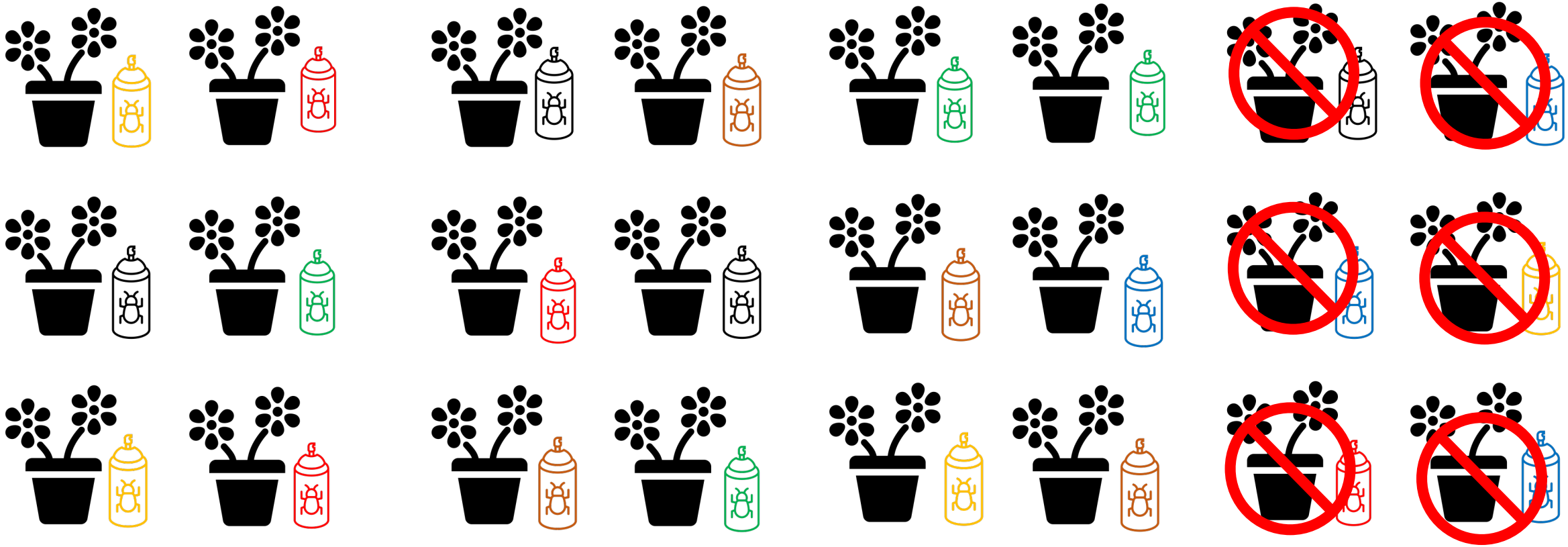
Units between blocks are different.



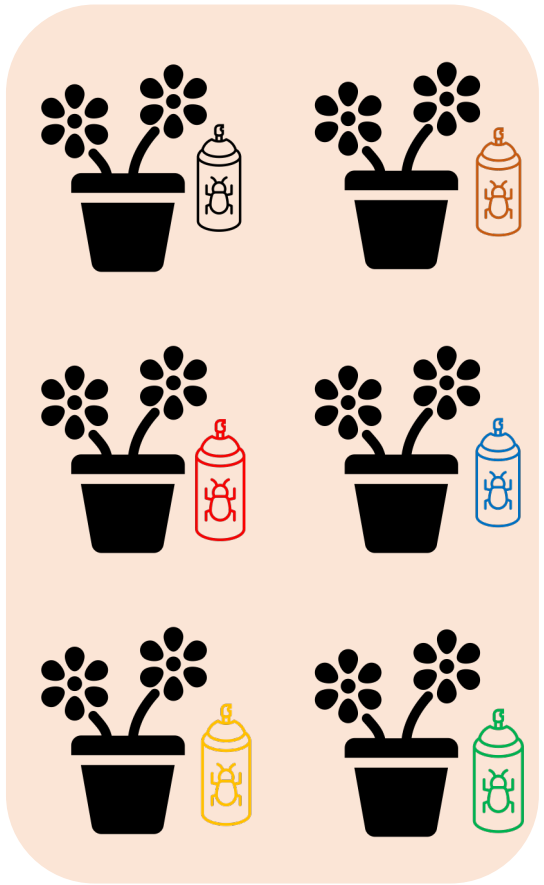
All treatments appear once in a block

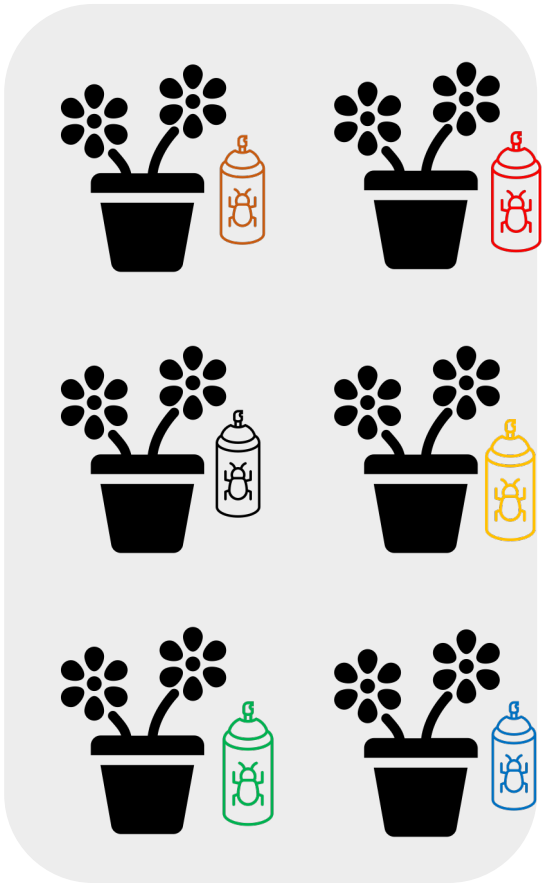
So why RCBD over CRD?

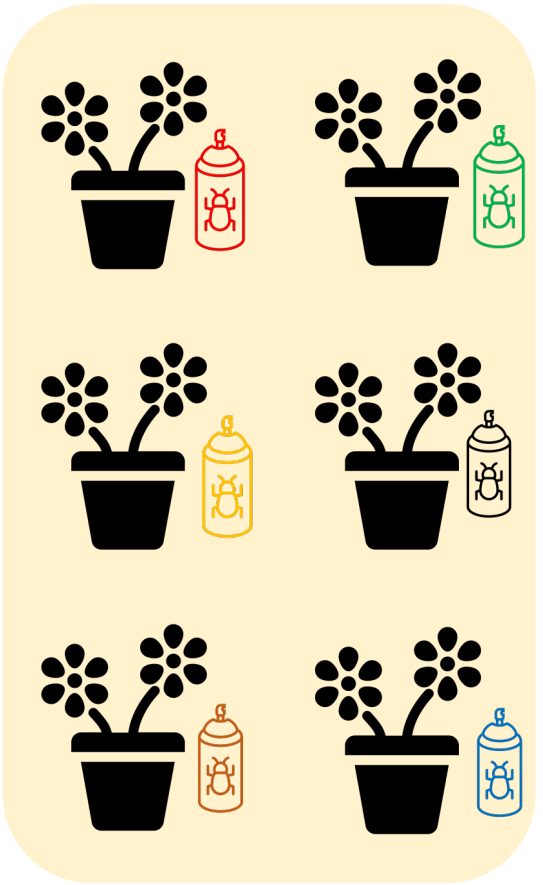


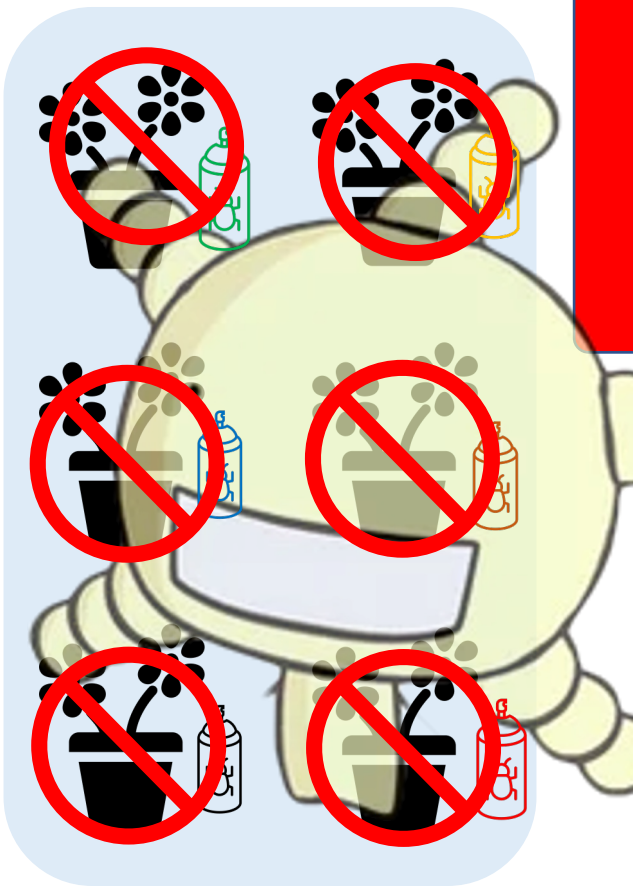


Door

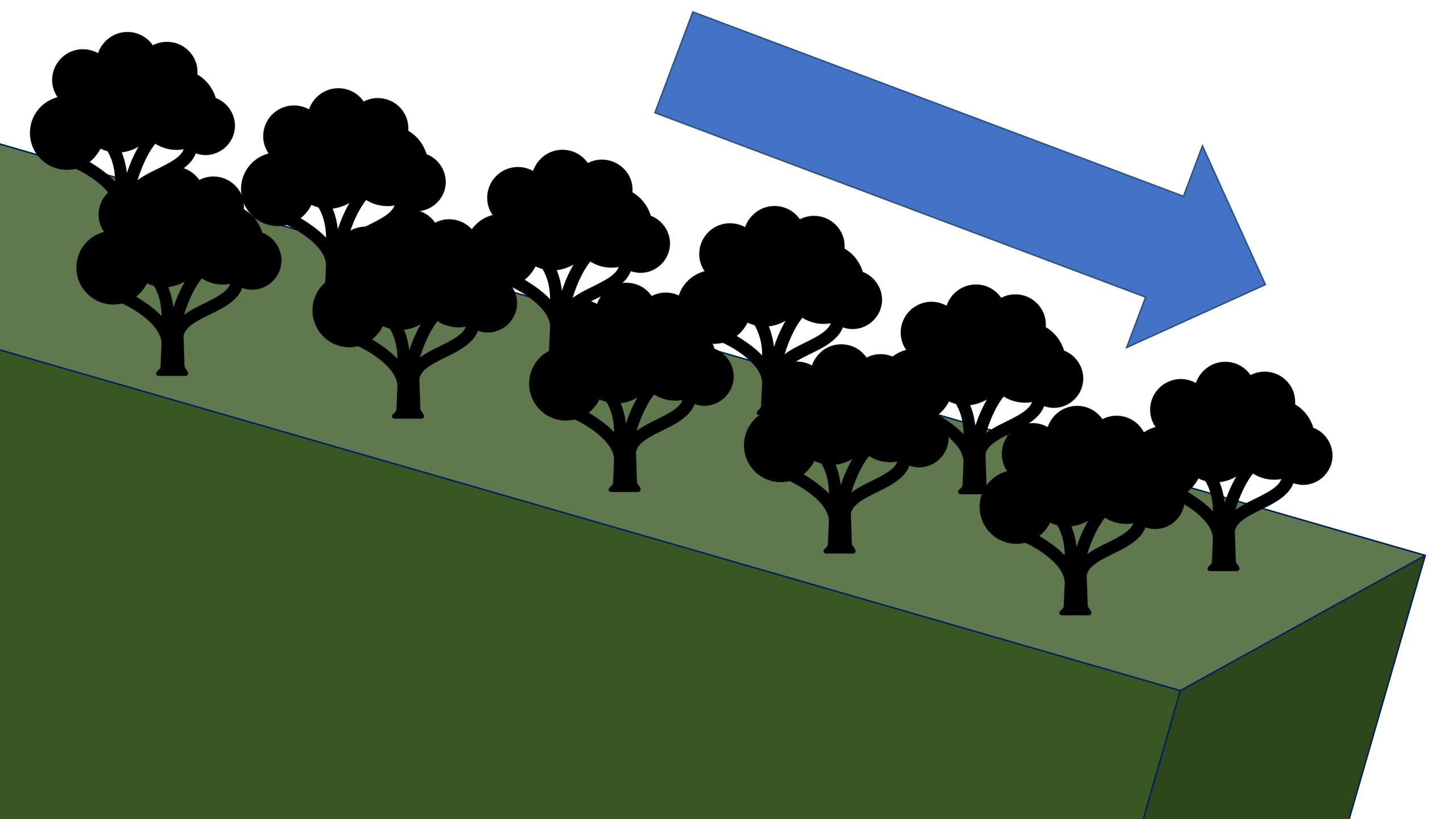


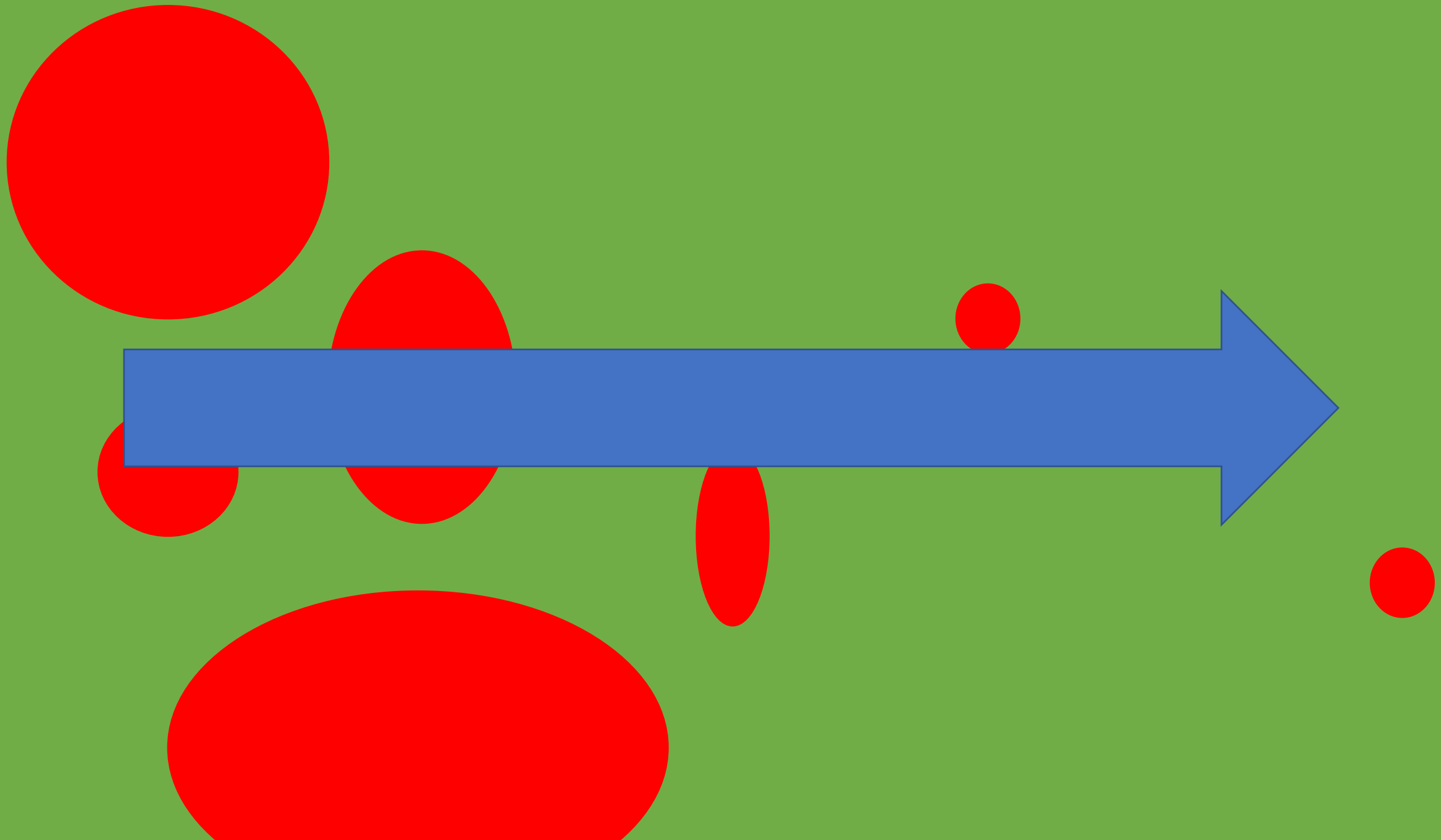




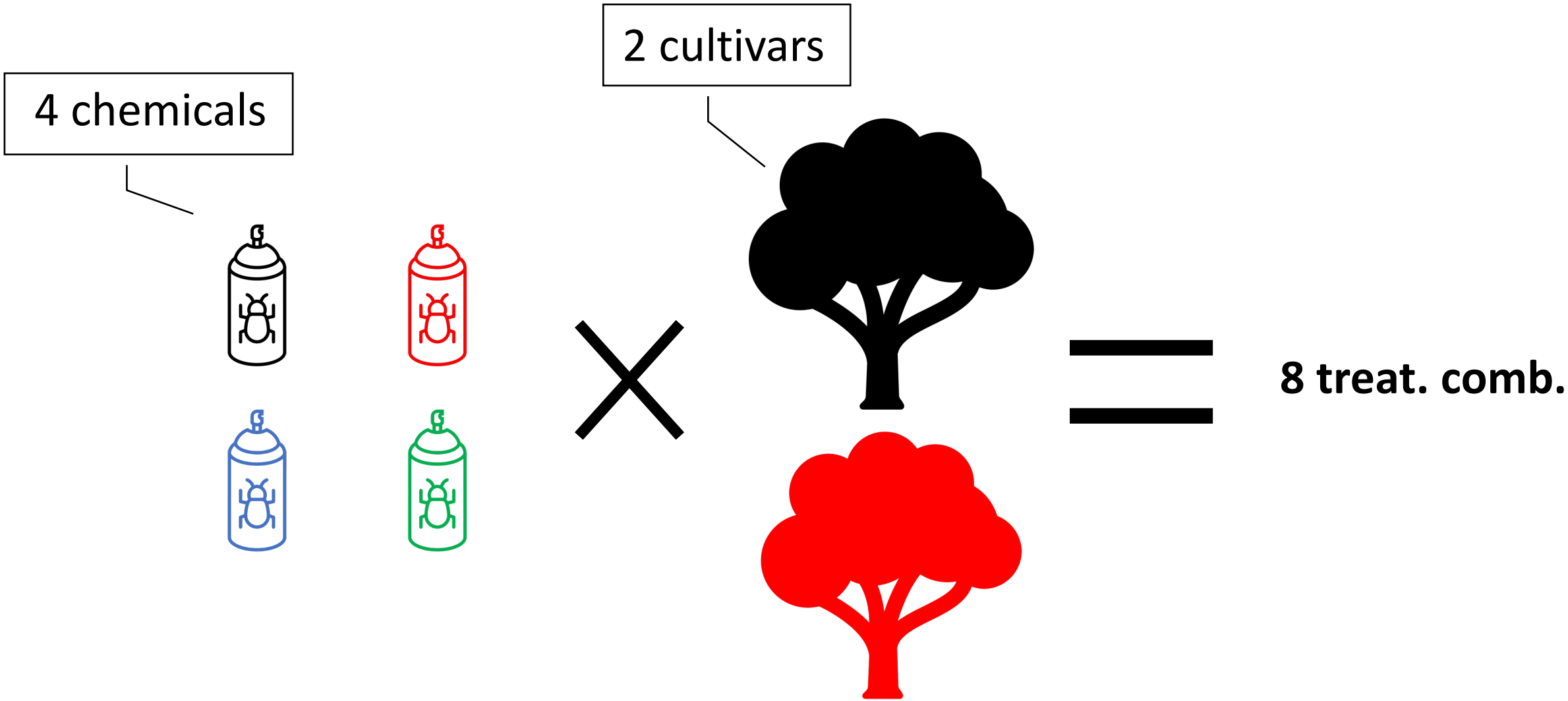


Fan

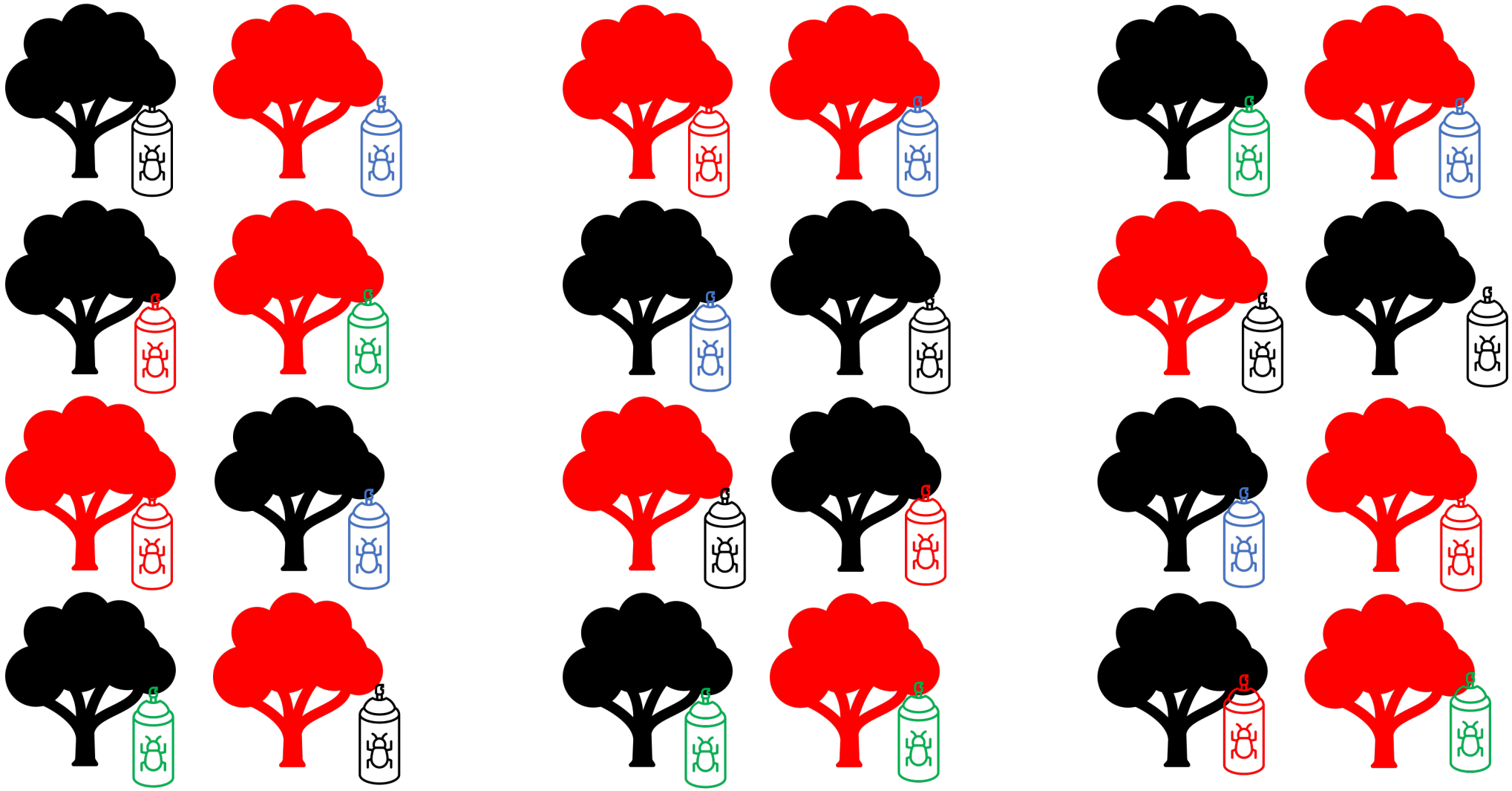




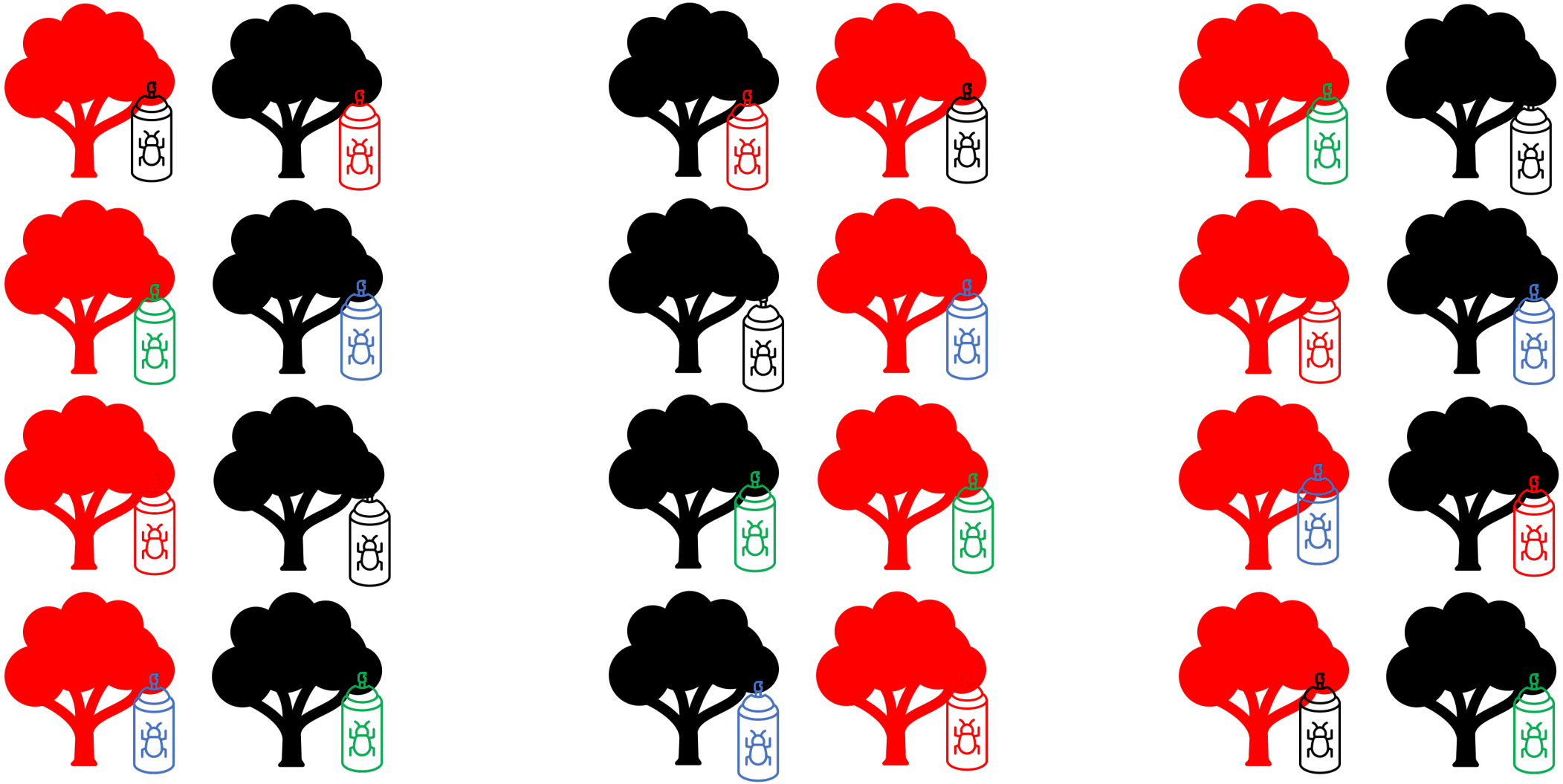
What is **Split-plot Design**


4 chemicals
2 cultivars
8 treat. comb.

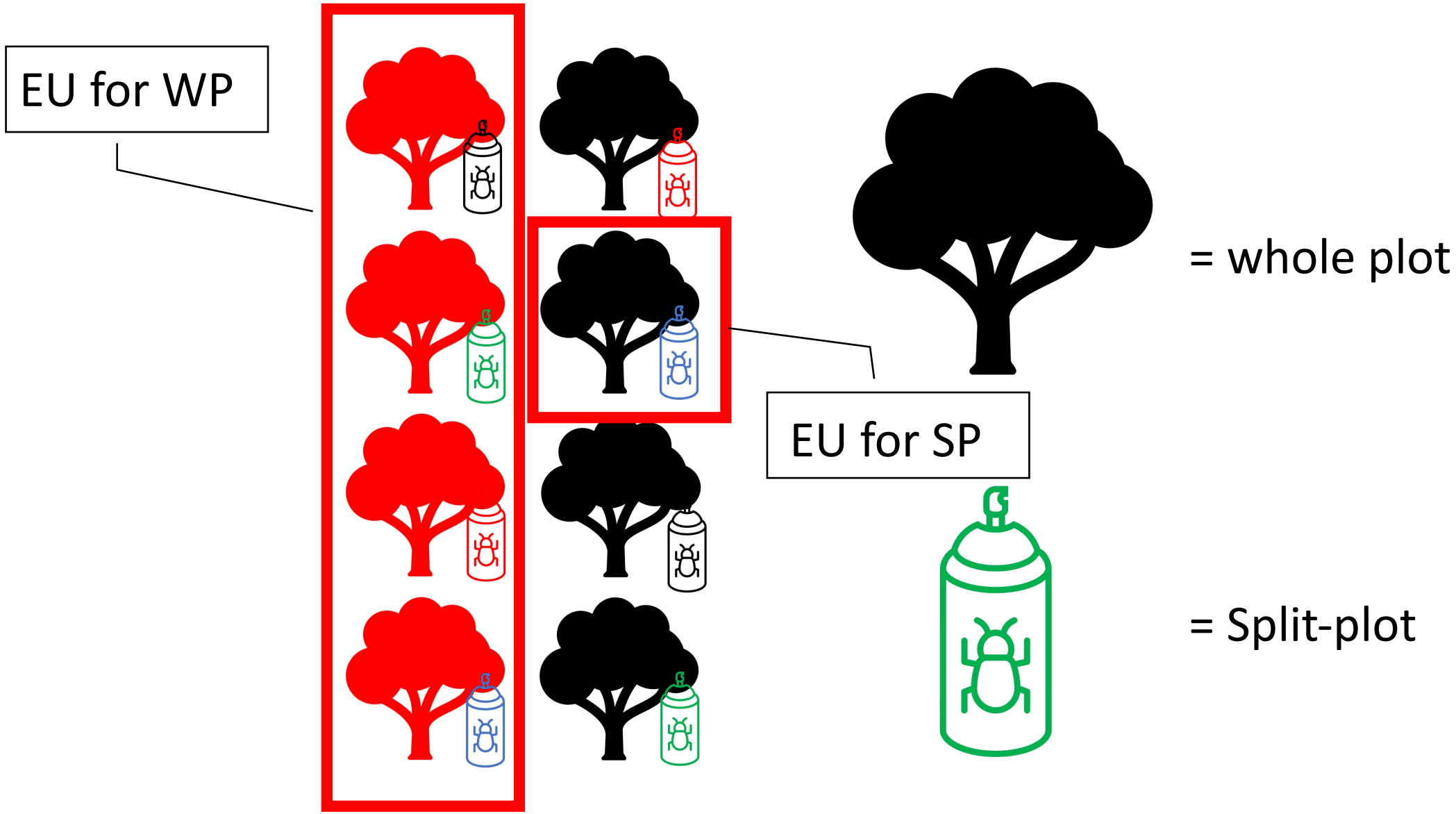
Idealy…



But reality is often this.



But reality is often this.

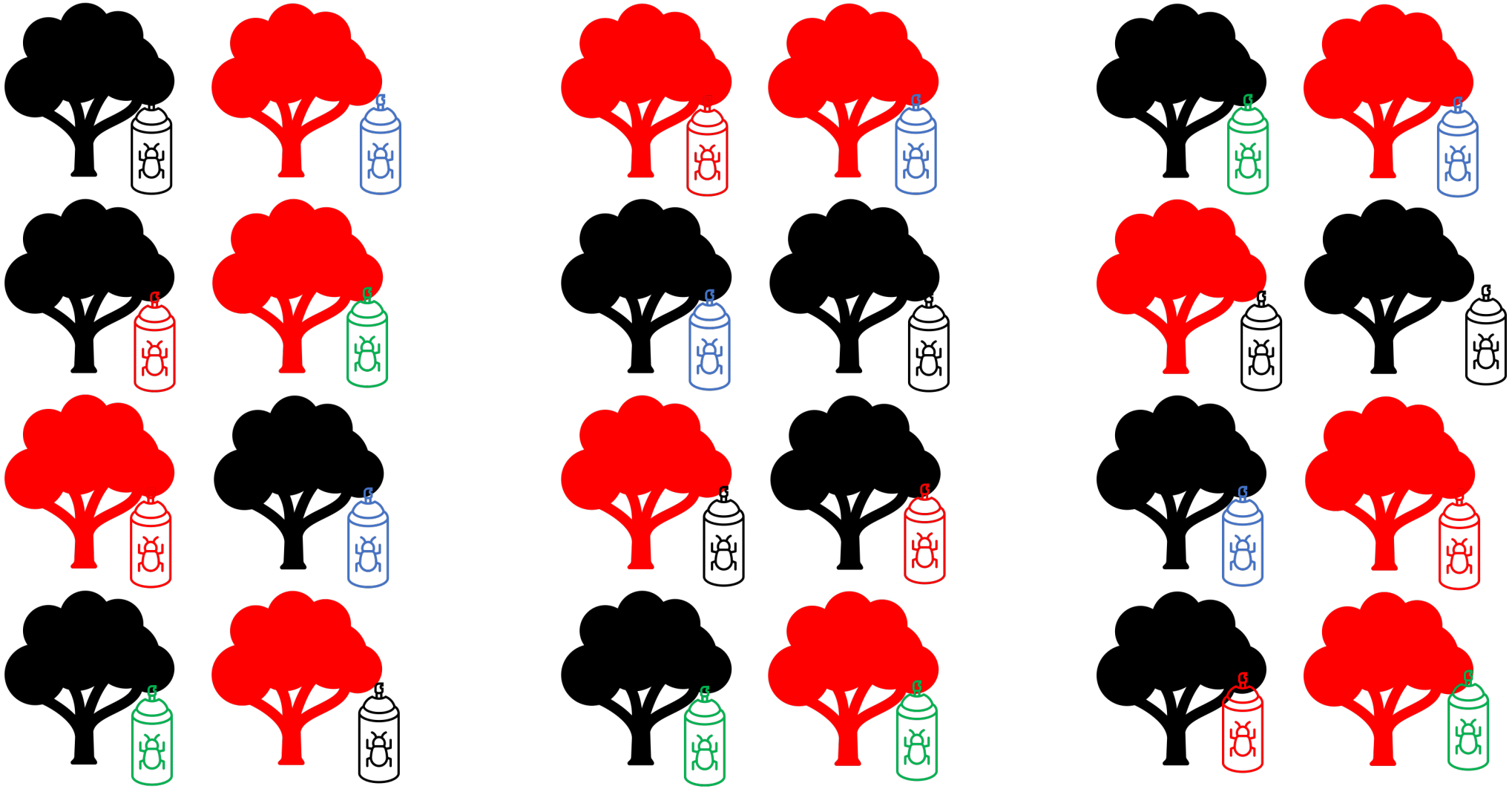


Split-plot design eases the implementation of trials.

RCBD vs. Split plot design

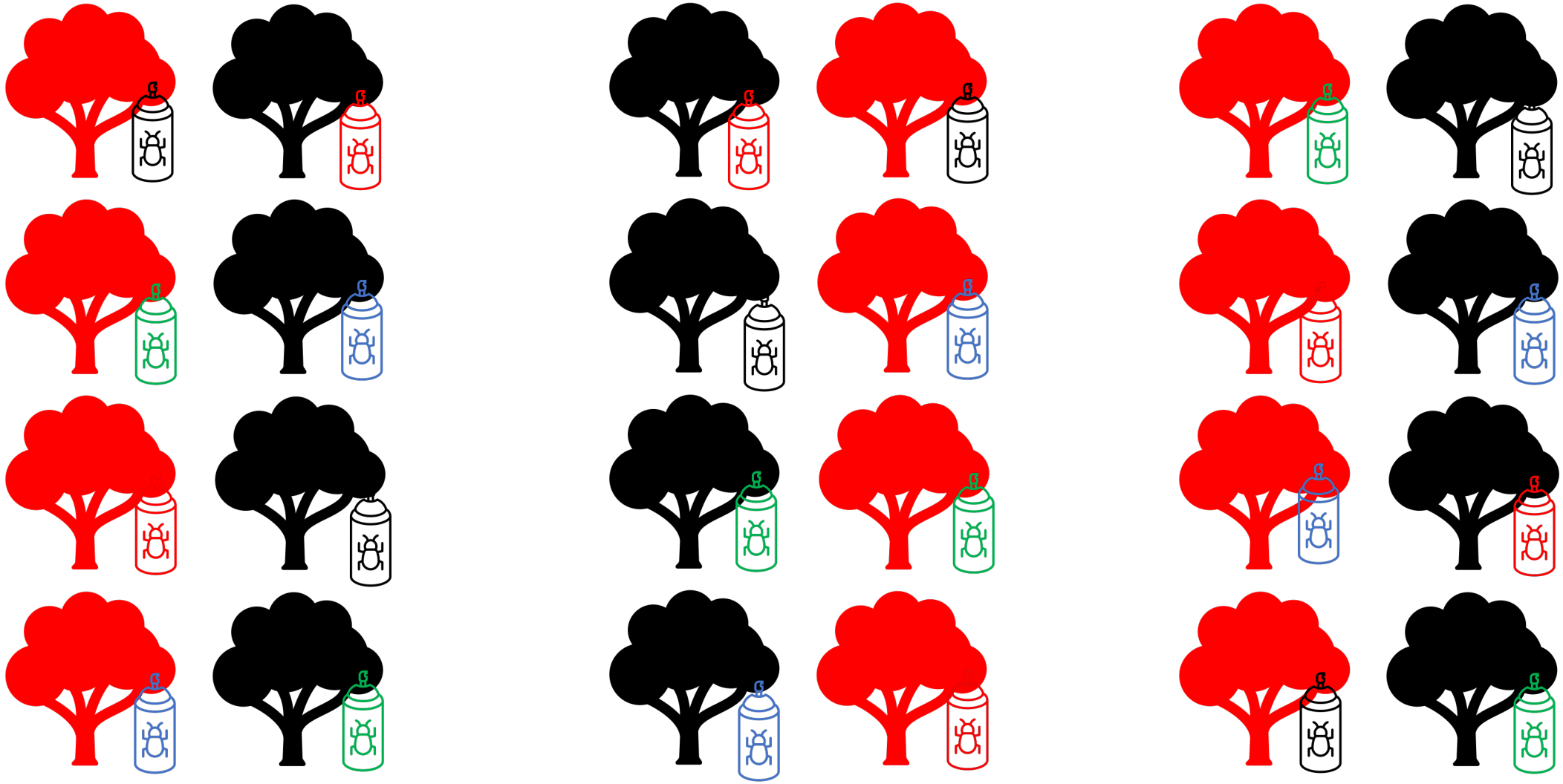
RCBD

Y = μ + Chemicals + Cultivar + Chem.*Cultiv. + Block + error



Split plot design

Y = μ + Cultivars + WP error + Block + Chemical + Chem.*Cultiv. + SP error



RCBD

Source of Variation	DF	Actual DF
Block (Rep)	b-1	3-1=2
Cultivar	c-1	2-1=1
Chemical	f-1	4-1=3
Cultivar x Chemical	(c-1)(f-1)	1*3 = 3
Error	(b-1)[(c-1)+(f-1)+(c-1)(f-1)]	2*(1+3+3) = 14
Total		23

Split plot design

More difficult to find difference
in the whole-plot.
Less affected in the Sub-plot.

Source of Variation	DF	
Block (Rep)	b-1	3-1=2
Cultivar	c-1	2-1=1
WP Error	(b-1)(c-1)	2*1 = 2
Chemical	f-1	4-1=3
Cultivar x Chemical	(c-1)(f-1)	1*3 = 3
SP Error	(b-1)[(f-1)+(c-1)(f-1)]	2*(3+3) = 12
Total		23

Designing is everything.
A wrong design can ruin any otherwise good experiments.

Let’s spend more time to think about your experimental desgin before you start your trials.

Announcement: the NemAfrica website is launched, and need your help for contents!

Click here!