



# Biodiversity 2030-2050:

## An art project to empower society in plant conservation

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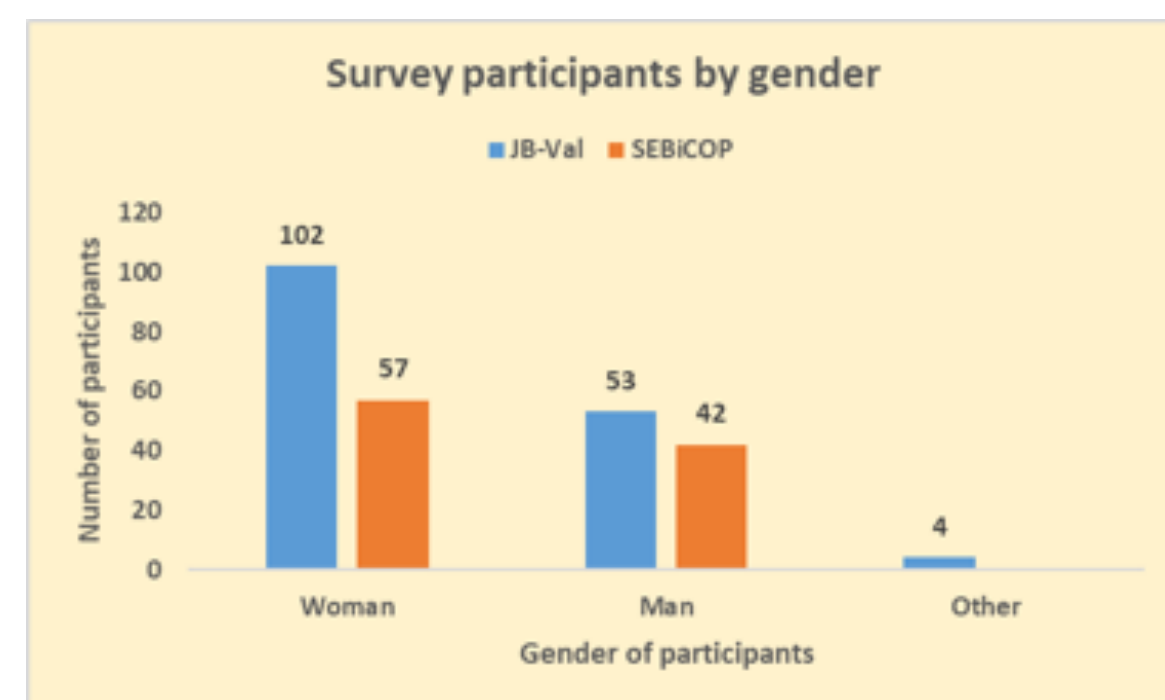
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### Introduction

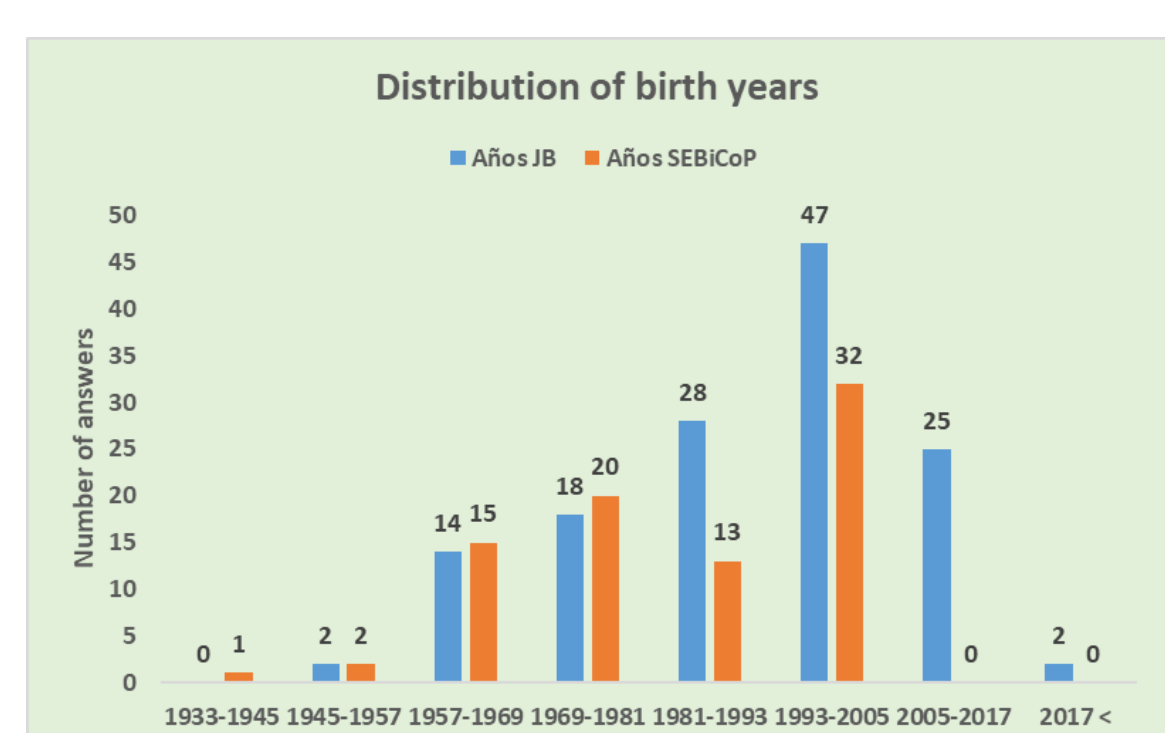
The 4th Mediterranean Plant Conservation Week is just around the corner, and one of the highlights will be the opportunity to visit the Biodiversity 2030-2050 project at the Botanical Garden of the University of Valencia (JBVal). This project, which was also showcased at the XI Congress of the Spanish Society for Plant Conservation Biology (SEBiCoP) in Las Palmas de Gran Canaria, is based on the "Visual Ecocriticism" perspective and aims to shed light on the "plant blindness" phenomenon. By analyzing public preferences and behaviour patterns regarding plant protection and conservation, the project hopes to establish crucial links between the selection made by the public and the information provided for each photograph to help their knowledge and argue their status. The comparative data of the first surveys collected in the JBVal (Stübing & Guara, 2023) with the surveys obtained at the SEBiCoP congress will be presented, which will help to gain a better understanding of this important issue.

### Results

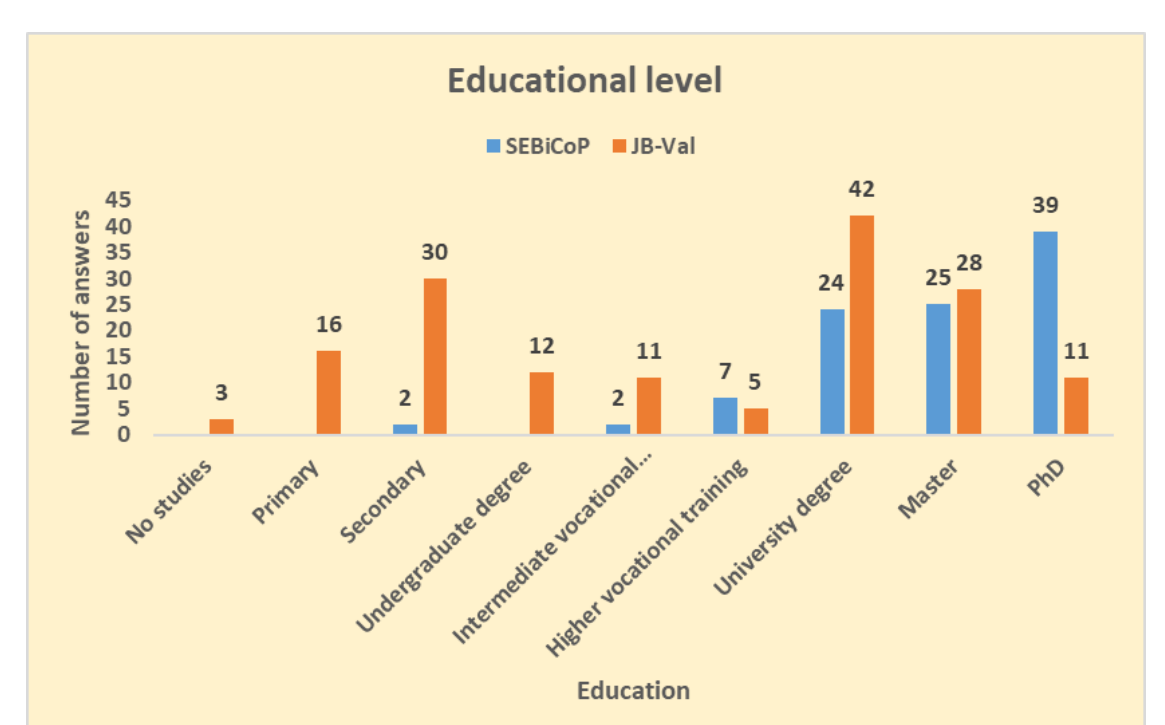
#### a) Sample descriptors and contrasts



The proportion between the genders of the participants is not equivalent ( $\chi^2 = 38,407, p < 0,0001, d.f. = 2$ ). The proportion of women is higher in the JB-Val than in the XI SEBiCoP congress, and the ratio of women/men is 1.92 in the JB-Val and 1.36 in SEBiCoP.



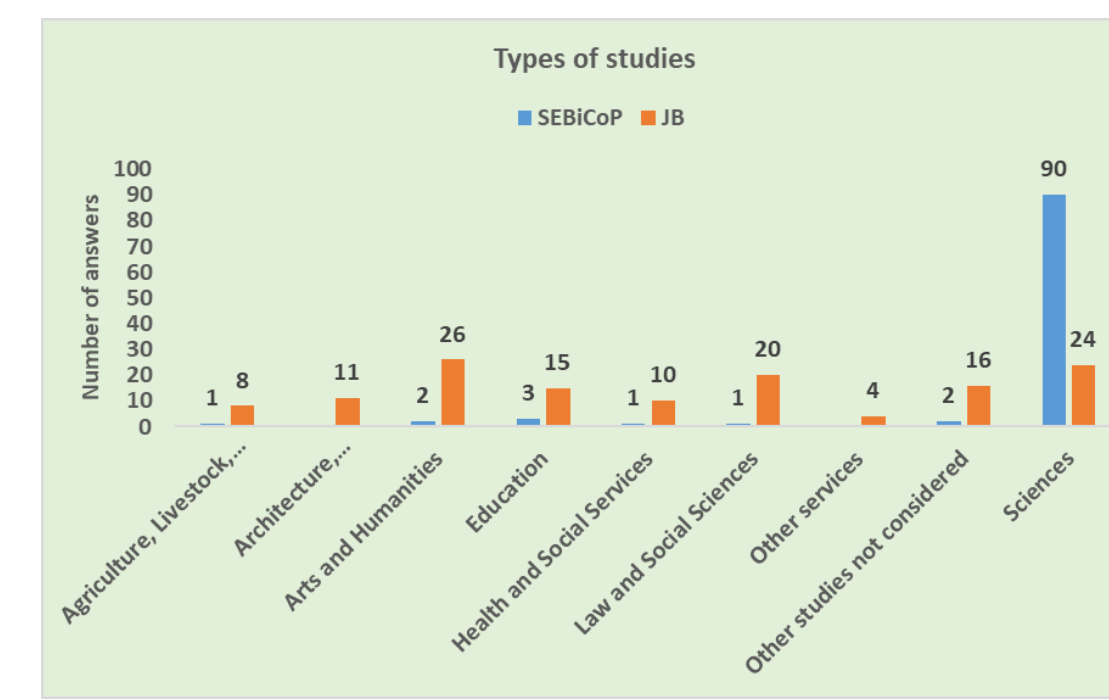
There are significant differences between the participants based on their ages (7 classes of birth years) ( $\chi^2 = 25,606, p < 0,0006, d.f. = 7$ ). In both samples, the largest number of participants is in the 1993-2005 class (ages between 18 and 30 years old). However, in the JB-Val the classes 1981-1993 and 2005-2017 show a significant number of participants, higher than that of the SEBiCoP.



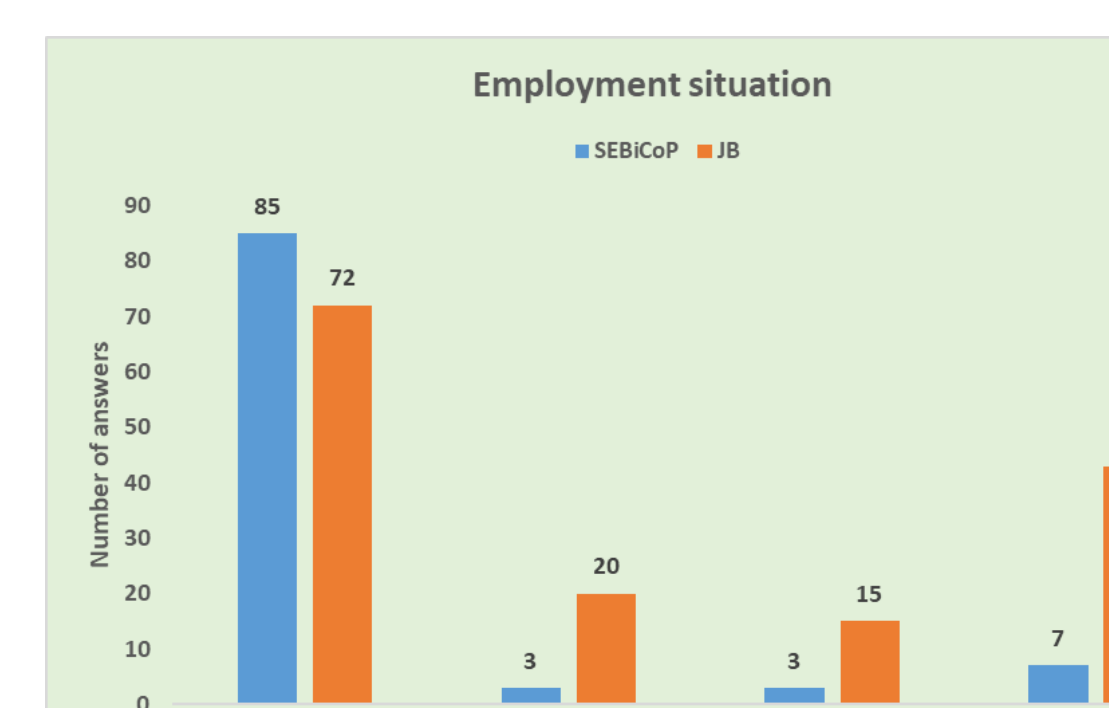
The educational level is significantly different between both samples ( $\chi^2 = 144,61, p < 0,0001, d.f. = 8$ ). The SEBiCoP sample is biased towards higher levels of education, although the proportion of participants with a university degree is very similar. In the JB-Val sample, the participants are more distributed among the different educational levels.

### Material and methods

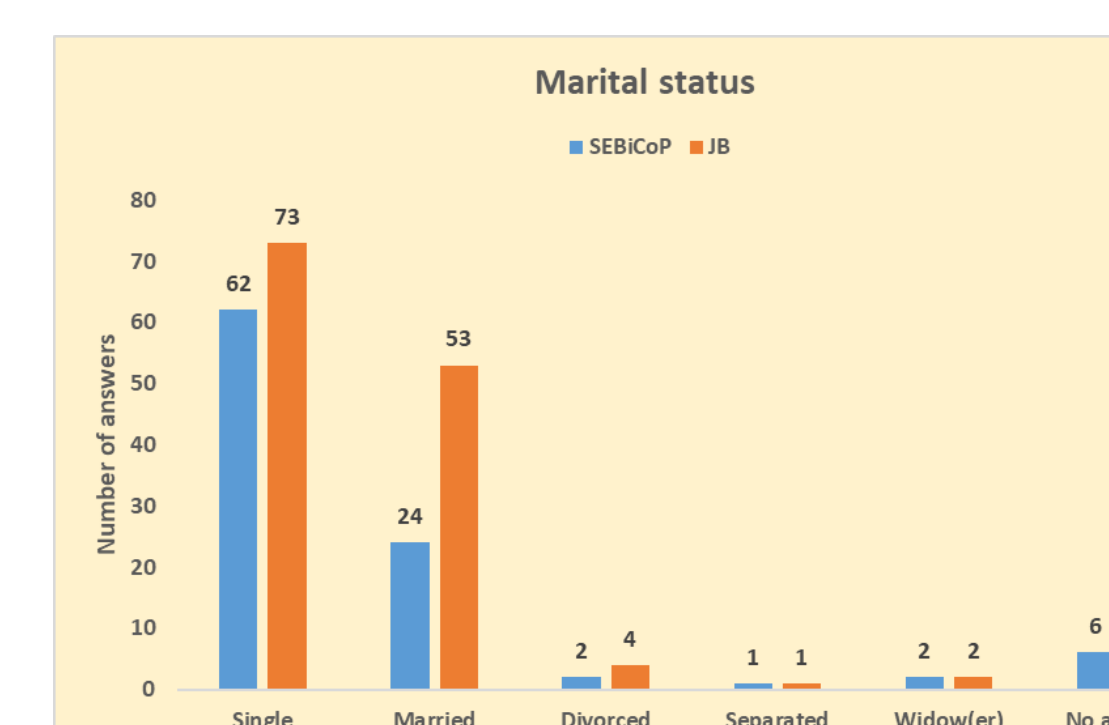
From a "happening" action consisting of a vote with ballots and a ballot box, the participating public will select two images of species from among twelve, that should be protected according to their criteria. Each image is accompanied by a template that collects botanical information (scientific and common names, chorology or uses, among others). Participants will respond anonymously to a series of simple items regarding themselves (age, gender, level and type of education, employment status and marital status). The collected data, stored in an MS Excel (2016) database, were analysed using univariate and multivariate statistical techniques using PAST 4.13 (Hammer et al., 2001) and NTSYSpc 2.2 (Rohlf, 2018).



There are clear differences between the types of studies of the participants in both samples ( $\chi^2 = 272,78, p < 0,000001, d.f. = 8$ ). The SEBiCoP sample is clearly biased towards science studies, while in the JB-Val there is greater diversification among the survey participants.



There are differences between both samples regarding the employment status of the participants ( $\chi^2 = 56,537, p < 0,000001, d.f. = 3$ ). In both samples, the "employed" status predominates, but in the JB-Val sample, other employment situations that are underrepresented in the SEBiCoP group stand out.

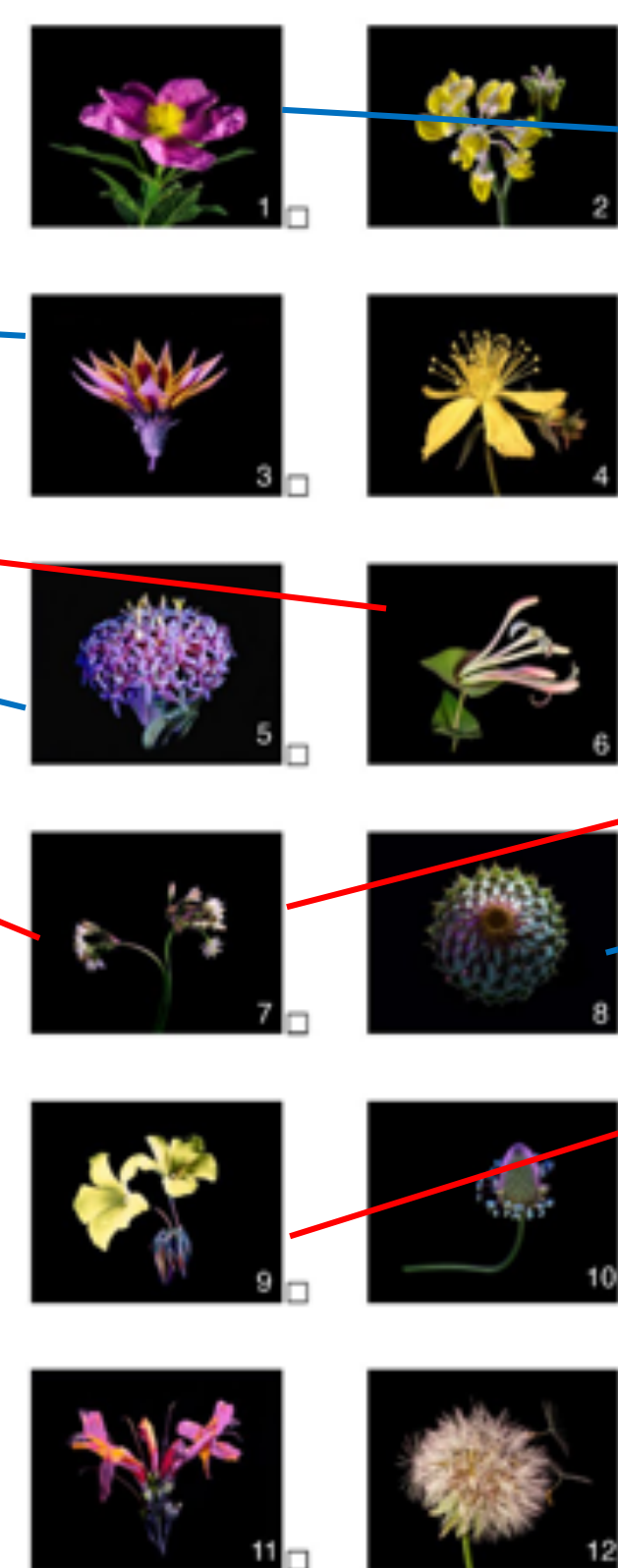


Differences are detected between both samples when considering the marital situation of the participants ( $\chi^2 = 23,925, p < 0,00022, d.f. = 3$ ).

#### b) Preferred images: groups and trends

	Img-1	Img-2	Img-3	Img-4	Img-5	Img-6	Img-7	Img-8	Img-9	Img-10	Img-11	Img-12
Img-1	33											
Img-2	11	24										
Img-3	17	16	66									
Img-4	16	12	16	37								
Img-5	13	14	26	15	52							
Img-6	12	13	14	12	13	19						
Img-7	12	13	13	11	11	17	43					
Img-8	12	14	26	14	22	12	11	11				
Img-9	14	13	18	13	16	12	13	12	32			
Img-10	17	14	20	15	18	13	11	15	24	40		
Img-11	14	13	14	15	14	12	13	13	14	13	34	
Img-12	13	13	14	14	16	11	11	14	15	14	12	27

You choose!  
From the following images, mark with an X which two plants you would keep?



	Img-1	Img-2	Img-3	Img-4	Img-5	Img-6	Img-7	Img-8	Img-9	Img-10	Img-11	Img-12
Img-1	42											
Img-2	3	13										
Img-3	2	1	14									
Img-4	8	1	1	17								
Img-5	5	2	2	1	18							
Img-6	7	0	2	1	0	19						
Img-7	0	1	0	0	0	0	1					
Img-8	16	3	5	3	1	4	0	40				
Img-9	2	2	1	0	1	0	1	0	0			
Img-10	2	1	0	1	5	2	0	0	4	0		
Img-11	1	2	2	0	3	1	0	1	1	0	7	
Img-12	1	1	3	1	3	2	0	2	1	0	1	10

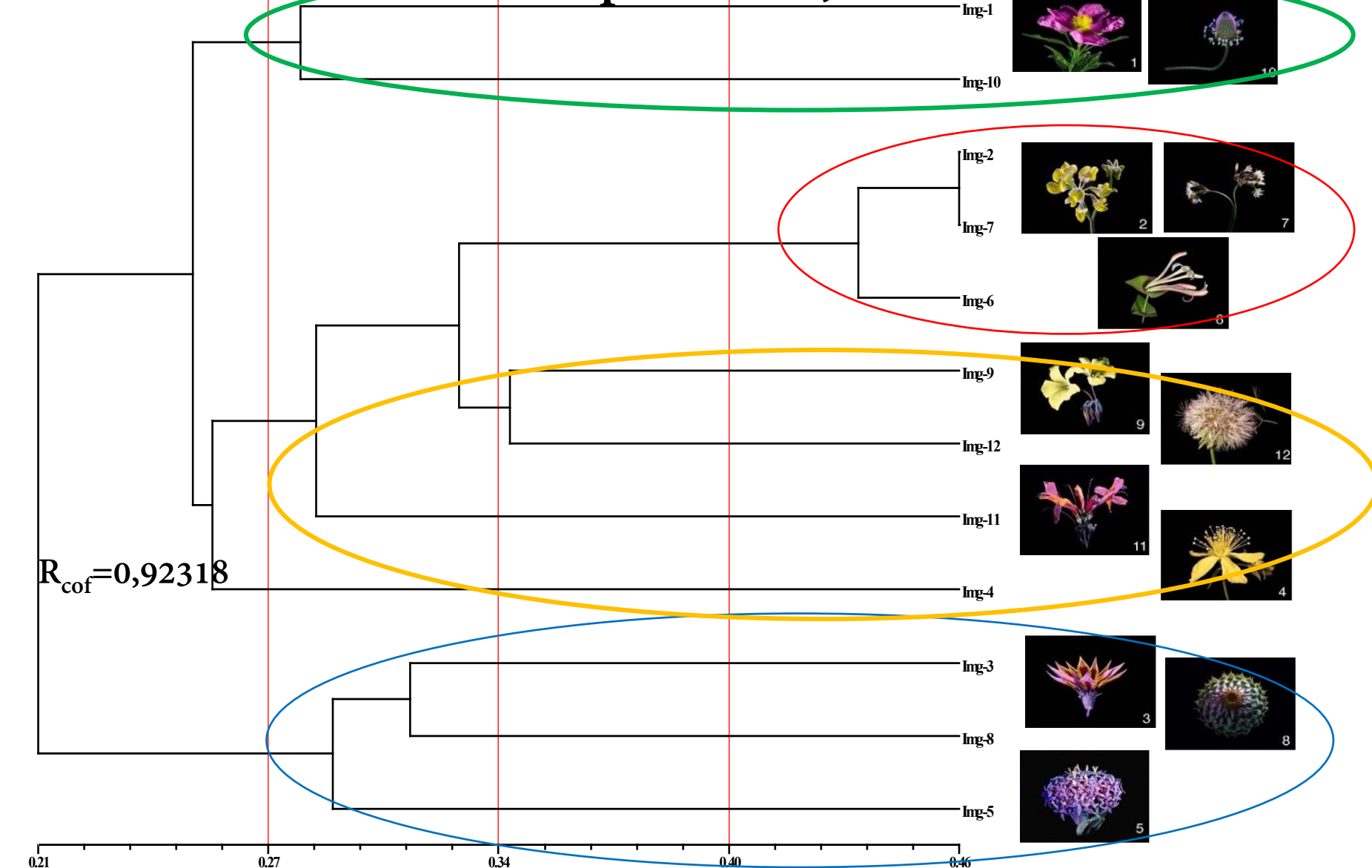
- Exhibition of the Botanical Garden of Valencia. Simple selections
- Img-1 *Cistus creticus* L.
- Img-2 *Coronilla juncea* L.
- Img-3 *Gazania* sp. Gaertn.
- Img-4 *Hypericum perforatum* L.
- Img-5 *Kleinia grantii* Hook. Fil.
- Img-6 *Lonicera implexa* Aiton
- Img-7 *Nothoscordum gracile* (Aiton) Stearn
- Img-8 *Onopordum nervosum* Boiss.
- Img-9 *Oxalis pes-caprae* L.
- Img-10 *Plantago lagopus* L.
- Img-11 *Tecoma capensis* Lindl.
- Img-12 *Urospermum picroides* (L.) Scop. Ex F.W. Schmidt

The selection of the two plants that should be conserved are different at first glance in the samples considered. Statistically, both samples are different ( $\chi^2 = 997.73, p < 0.000001, d.f. = 11$ ).

- Exhibition during the XI SEBiCoP congress in Las Palmas de Gran Canaria. Simple selections
- Img-1 *Cistus creticus* L.
- Img-2 *Coronilla juncea* L.
- Img-3 *Gazania* sp. Gaertn.
- Img-4 *Hypericum perforatum* L.
- Img-5 *Kleinia grantii* Hook. Fil.
- Img-6 *Lonicera implexa* Aiton
- Img-7 *Nothoscordum gracile* (Aiton) Stearn
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- Img-11 *Tecoma capensis* Lindl.
- Img-12 *Urospermum picroides* (L.) Scop. Ex F.W. Schmidt

There has been no coincidence in the plants to be conserved. However, there has been a coincidence in at least one of the less chosen plants (*Nothoscordum gracile* -Image 7-)

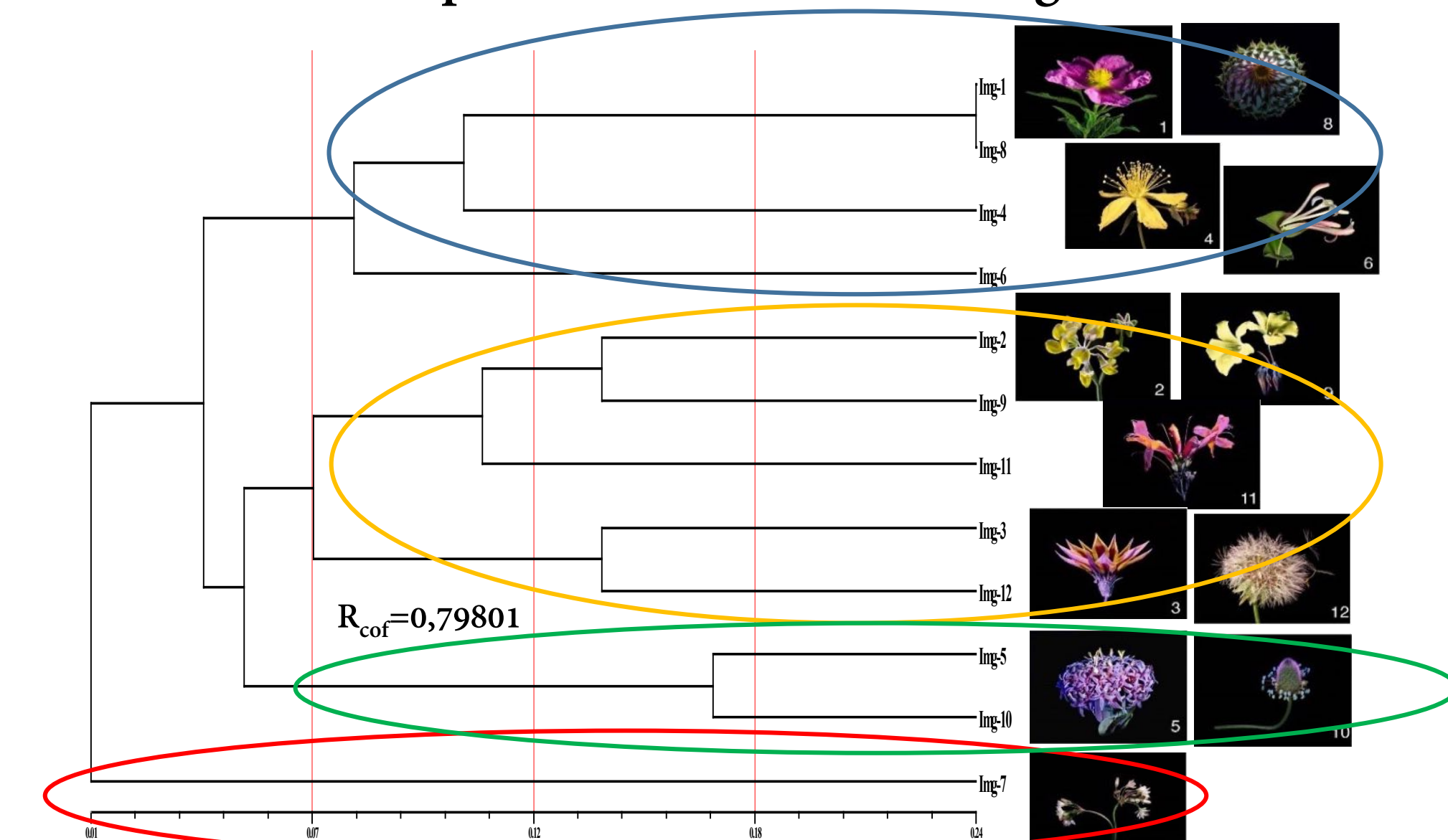
#### Cluster Analysis (UPGMA): binary matrix (0, 1) of selected plants in JB-Val



Visually, both dendrograms (UPGMA cluster analysis) are different, as confirmed by the Mantel test of the similarity matrices for the presence-absence matrices of the selected images. The cophenetic correlation between these matrices, calculated using the Jaccard's index, is very poor because it has a value of  $r_{coph} = -0.15264$  ( $t = -1.1329, p = 0.1286$ ).

The red ellipses show the species groups with the lowest number of selections, while the blue ellipses show the most selected ones. Orange ellipses show intermediate selections and green ellipses show preferred selections.

#### Cluster analysis (UPGMA): binary matrix (0, 1) of selected plants in XI SEBiCoP congress



### Conclusion

This preliminary study of the surveys analysed in the Biodiversity 2023-2050 exhibitions reveals a different selection criterion depending on the population samples considered. The selection of the images that would be preserved in the JB-Val sample shows a subjective selection criterion, based on an aesthetic appreciation while in the sample of the XI SEBiCoP congress, the aesthetic criterion is modified by the scientific knowledge of the plants, that is, a more practical and applied criterion.

### References

- Hammer, Ø., Harper, D.A.T., and P. D. Ryan, (2001). PAST: Paleontological Statistics Software Package for Education and Data Analysis. *Palaeontologia Electronica* 4(1): 9pp.
- MS Excel (2016). Retrieved from <https://office.microsoft.com/excel>
- Rohlf, F. J. 2018. NTSYSpc: numerical taxonomy system. ver. 2.21c. Applied Biostatistics, Inc.: Port Jefferson: New York.
- Stübing, G, and Guara, M. (2023). Biodiversidad 2023\_2050: análisis multivariante aplicado a un proyecto de Ecocriticismo visual.. XI SEBiCoP congress, Las Palmas de Gran Canaria, July, 17th to 21th.