

1. Where did you place each samphire on the *Rehabilitation site* worksheet? Explain why.

- *Tecticornia indica*

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- *Tecticornia pergranulata*

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- *Sarcocornia quinqueflora*

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2. Samphires have structural and physiological adaptations that work together to enable plants to tolerate various environmental conditions. For each condition, identify structural adaptations and any associated physiological adaptations, by completing the table.

ENVIRONMENTAL CONDITION	STRUCTURAL ADAPTATIONS	ASSOCIATED PHYSIOLOGICAL ADAPTATIONS
salinity		
drought		
flooding		

3. Why is it helpful for plants that live in arid environments to use C<sub>4</sub> photosynthesis for carbon fixation?

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4. C<sub>4</sub> photosynthesis suppresses a process called photorespiration. This means these plants release less CO<sub>2</sub>. What is the advantage of this to the plant?

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5. Increasing numbers of environmental scientists have been studying mechanisms of C<sub>4</sub> photosynthesis for carbon fixation. What would be the environmental advantage of growing more plants, like samphires, that use C<sub>4</sub> carbon fixation?

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6. Samphires grow slowly. How does this help them survive?

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- Salt load is a measure of the concentration of salt in soil, measured in grams of salt per kg of soil. Figure 1 shows the salt load of soil tolerated by 19 species of samphire from the *Tecticornia* and *Sarcocornia* genera. Use this figure to answer questions 7-9.

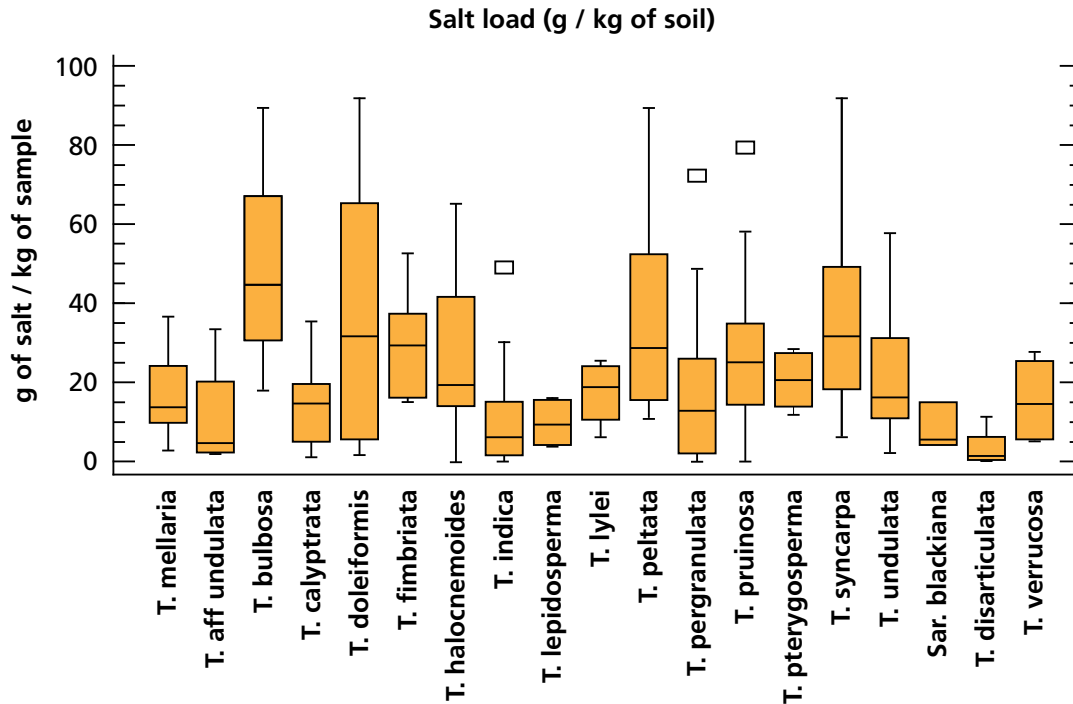


figure 1: graph adapted from *Understanding Species Zonation of Samphires (Salicornieae) in the Goldfields of Western Australia* by Bindy Datson, Actis Environmental Services, May 2005

Figure 1 is called a box plot or box and whisker diagram. These are useful for showing data that has a lot of variation in it. The ‘box’ shows where the middle 50% of data points lie and has the median marked. The ‘whiskers’ show the bottom 25% and top 25% of the data range. Outliers can also be shown with small boxes; these data lie significantly out of the range of other data.

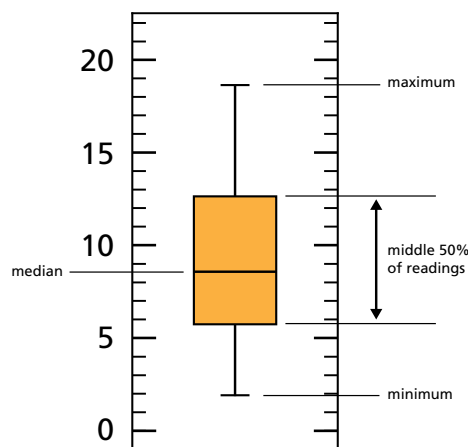


figure 2: components of a box and whisker plot

7. Which samphires are best suited to living in very saline areas?

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8. What kinds of adaptations might these samphires have?

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9. *Tecticornia indica* and *Tecticornia pergranulata* are two samphires you placed on the zonation diagram. Find them on the salt load graph (figure 1).

a. What is the median salt load for each of these samphires?

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b. Are these readings what you would have expected given their location on the zonation diagram? Explain your answer.

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c. The salt load of *Sarcocornia quinqueflora* doesn't appear on the graph because its load wasn't measured in the experiment. Would you expect it to be high or low? Explain your answer.

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d. What advantages are there in displaying data as a box and whisker chart, instead of simply tabulating the average amount of salt tolerated by each plant? What extra information does it tell us about where each plant can grow?

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## Research question

10. Use the internet or other sources to find out more. Adaptations of samphires make them very useful in revegetating saline areas, including farmland, sand dunes and abandoned saline mining areas. What role do samphires play in rehabilitation of salt-affected land?