LIGULE – the distribution of promising native grasses – a geographic perspective

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ABSTRACT

Eight hundred and seven accessions of 37 target species of native grasses were collected from a total of 210 locations in NSW and Victoria in 1989 and 1990. Accessions were established in test rows in nurseries located at Wagga Wagga and Rutherglen and evaluated over a period of 2 years. A ranking procedure was used to determine if persistence in the respective nurseries was related to the linear distance away of each accession's collection location. Although the data for Wagga Wagga indicated that persistence was related to distance away, this was not the case for Rutherglen. Trends were neither sufficiently consistent nor strong enough to support the hypothesis that distance could be used as a predictor of performance. It was concluded that the success of a broadly-based species evaluation program depended ultimately on collecting accessions from widely diverse environments.

KEY WORDS

Native grasses, grass collection.

INTRODUCTION

There is a need to develop a wider range of commercially available, well adapted grasses for use on landscapes where currently available cultivars lack persistence (1).

Eight hundred and seven accessions of 37 target species of native grasses were collected from a total of 210 locations in NSW and Victoria in 1989 and 1990 and established in test rows in nurseries at Wagga Wagga and Rutherglen. Accessions were evaluated for a range of attributes over a period of 2.5 years. Not all accessions were represented in each nursery and nursery rows were not replicated.

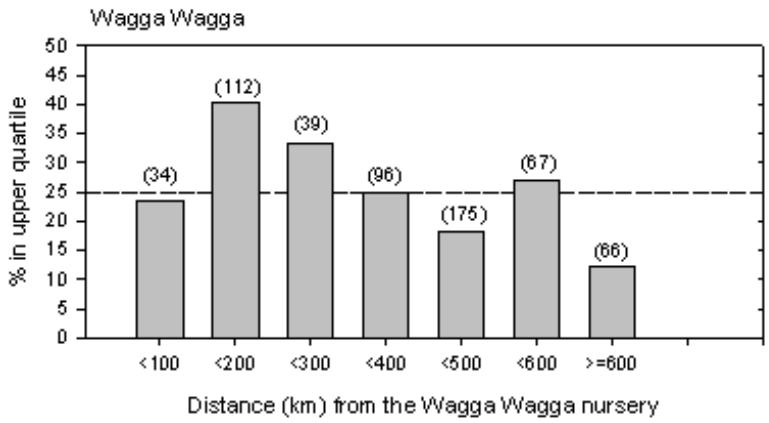
Persistence over time was considered the most important attribute for assessing the accessions. For each nursery, a dataset was constructed that compared persistence with the locations where the accessions were originally collected. Data were then ranked on persistence. The upper quartile of the ranked persistence dataset was examined with the aim of determining if for these above-average performing accessions, persistence was related to the linear distance away of their collection locations. If so, this could indicate zones where it may be profitable to concentrate future collection activity.

A logistic regression was undertaken of each site's data. The data took the form of a Y variate representing the binary (0,1) occurrence of membership in the upper quartile, and an X variable which was the actual distance (km) from the nursery. This model is a particular form of generalized linear model, with an error distribution assumed to be binomial and a logit link function between the linear explanatory variable and the predicted probability of membership of the upper quartile class.

RESULTS

Histograms showing the % frequency of accessions in the upper persistence quartile in each distance group for each nursery are shown in Figure 1. For accessions tested at Wagga Wagga, logistic regression suggested that probability of membership of upper quartile was related to the distance from nursery (slope parameter = -0.002078, se = 0.000555, t = -3.57 on 583 df, $p < 0.001$). In contrast, the data for Rutherglen did not suggest such a relationship (slope parameter = -0.000576, se = 0.000575, t = -1.00 on 355 df, $p = 0.316$).

Within each distance bandwidth of 100 km, lack of association between persistence and distance would be indicated by about 25% of the accessions collected, being ranked in the upper quartile of each nursery's dataset. Figure 1 shows that this was the case for accessions collected from less than 100 km and between 300 and 400 km away from each nursery. Accessions collected between 100 and 300 km from the nursery locations showed above-average representation in the upper quartile. For accessions evaluated at Wagga Wagga, a second peak was noted for accessions collected between 500 - 600 km away, while for Rutherglen the second peak occurred for those collected between 600 – 700 km away. (This could have been a phase difference because the nurseries themselves were about 100 km apart.)



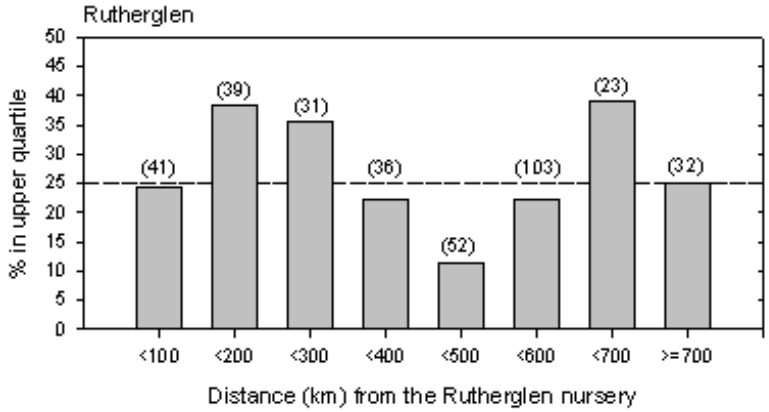


Figure 1. Frequency histograms for each nursery location, of the numbers of upper-quartile accessions in each distance group. Numbers in parenthesis are the total numbers of accessions collected within each distance band.

CONCLUSIONS

Trends relating persistence and distance from the test nurseries were evident, and in the case of the Wagga Wagga were statistically significant. However they were neither sufficiently consistent nor strong enough to support the hypothesis that distance could be used as a predictor of performance. Other factors relating to adaptability, such as rainfall, soil physical and chemical characteristics, competition from alien plants and grazing seem to be of equal or greater important determinants of persistence in the nurseries.

It was concluded that the success of a broadly based species evaluation program depends ultimately on collecting a large number of accessions from widely diverse environments in order to maximise the range of adaptive traits embodied in the test population.

ACKNOWLEDGMENTS

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REFERENCES

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