

Ranking sub clover lines with respect to several characteristics considered simultaneously

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In evaluation work, the need to assess and compare lines in terms of several characteristics considered simultaneously often arises. In such situations, no single, unique ranking exists; rather, several rankings are possible, each potentially able to shed light on overall

performance. In cultivar trials a desirable form of ranking system is one which differentiates cultivars to the maximum possible extent. The ranking is arrived at as a weighted sum of the observed measures for each cultivar, with the weightings carefully chosen to maximise the cultivar differences. Such a ranking is provided by the technique of principal component analysis.

Methods

We wish to rank $n=19$ cultivars and introduced lines of sub clover (for each of which $p=7$ variables, ie. measures of performance, were available) in terms of a single, comprehensive index of performance. The variables and some of the lines in question are listed in Tables 1 and 2, respectively. Principal component analysis was applied to the covariance matrix \underline{S} , where $\underline{S}=(n-1)^{-1}\underline{X}'\underline{X}$, and \underline{X} the (17×7) data matrix.

Results and discussion

Weightings for variables are reported in Table 1 and the overall ranking of cultivars in Table 2.

Table 1. variable weightings

Variable	Weightings
winter production	0.53
spring production	0.15
seed yield	0.75
seed reserves	0.34
late spring prod.	-0.07
late spring prod.	-0.06
seed yield	0.06

Table 2. ranks of selected cultivars

89816 F	2.87
89774 F	2.65
Karridale	2.40
Trikkala	1.87
Enfield	1.72
Mt. Barker	-1.54
Woogenellup	-1.69

Weightings for three of the variables are close to zero, indicating that these variables contribute little or nothing to differences between cultivars. The remaining weights are all positive and vary from 0.751 for seed yield and 0.15 for spring production. The derived ranking, which differentiates cultivars to the maximum possible extent, accordingly proves to be an expression of overall performance in which seed yield and winter production are especially important.

Two Sardinian accessions in the pre-release stage of evaluation appear to be superior to the now recommended Karridale, Trikkala and Enfield. These cultivars in turn out-perform the previously recommended Mt. Barker and Woogenellup (Table 2).

This procedure could be valuable in the early stages of evaluation when large numbers of lines are tested; when information on several characteristics is available; and when 20-30% of lines progress to the next stage of the programme.