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**Phenotypic evaluation of *Trifolium*
repens × *Trifolium uniflorum* F₁
interspecific hybrids as predictors of
BC₁ hybrid progeny**

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Abstract

Interspecific hybrids between white clover (*Trifolium repens*) and its close relatives are being created to address the lack of variation within white clover for traits relating to persistence and drought tolerance. This study addresses two concepts related to developing hybrid breeding strategies using *Trifolium repens* x *Trifolium uniflorum* hybrids. A first sandframe experiment investigated whether some of the first generation hybrid plants (F₁) with common parents were better than others as future parents. A second experiment assessed whether the performance of the first back cross (BC₁) progenies could be predicted from the parental F₁ phenotypes. The foliage, fertility, roots and dry weight production of four families of F₁ hybrids were evaluated following a period of growth in sand. From each family, the F₁ hybrids with the highest and lowest dry weight production were selected and back crossed to two contrasting white clover cultivars. The resulting BC₁ hybrid phenotypes were evaluated to ascertain whether any F₁ hybrids were markedly better as future parents in hybrid breeding programmes, and whether the F₁ phenotype could be used to predict that of the BC₁ progeny.

Differences in expression of more than half of the traits evaluated were found both between F₁ families, and among genotypes within F₁ families. Evaluation of the subsequent BC₁ generation identified large amounts of variation in expression of most traits both within and among hybrid families. However correlations between trait expression of the F₁ parent and the corresponding BC₁ progeny were weak to non-existent for most traits evaluated. The absence of correlations indicated that the performance of an F₁ hybrid genotype is not able to be used as a predictor of the BC₁ progeny phenotypes, and that selection out of the F₁ generation is futile in the formation of interspecific hybrid breeding populations.

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Abbreviations

°C	Degrees Celsius
BC ₁	Backcross 1 hybrid
cm	Centimetres
cv	Cultivar
F1	First filial generation
FDW	Foliar dry weight
FLO	Florets per inflorescence
g	Grams
IL	Internode length
LA	Leaf area
MA	Minimum anchoring
mm	Millimetres
MS	Maximum plant spread
NRD	Nodal root diameter
PL	Peduncle length
PS	Pollen stainability
RD	Root depth
RDW	Root dry weight
SD	Stolon density
SDi	Stolon diameter

sq

Square transformed

sqrt

Square-root transformed