Correlation Analyses of Seed Yield and Its Components in Bermudagrass

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Introduction Bermudagrass , *Cynodon dactylon* (L .) Pers . , is a warm-season , long-lived , sod-forming grass ubiquitously distributed in warmer regions of the world , and widely used for grazing and hay production , multiple turf applications , and soil stabilization and remediation (Harlan , 1970 ; Taliaferro , 1995) . Development and commercialization of seeded bermudagrass cultivars have increased dramatically in the USA in the past three decades . The objective of this study was to quantify correlation coefficients of seed yield and its components .

Materials and methods The field experiment included 56 half-sib families of common bermudagrass . The experimental design was a randomized complete block with three replications . Plot size was 2 .5×2 .5 m with 0 .5 m alleys between neighboring plots . Each plot was established by planting two seedlings 1 m apart equidistant from the center of the plot . Greenhouse grown seedlings were transplanted to a field in June 2001 on the Agronomy Research Station , OSU . Samples and visual data were collected in August 2002 and 2003 . Seed yield (SY) samples were harvested from a 30×30 cm area from each plot . Mature inflorescence samples , each comprising 5 seedheads were collected to determine the number of racemes (RNI) , raceme length (RLI) , number of seed (SNI) and seed set (SS) for each inflorescence . Inflorescence prolificacy (IP) of each plot was visually evaluated using a rating scale from 1 (no inflorescence) to 9 (most abundant) . Plot means for the response variables were used for statistical analyses . The SAS/PROC CORR and IML procedures were used to calculate phenotypic correlation coefficients and direct path coefficients , respectively .

Results and discussion Phenotypic correlation coefficients among SY and IP , SS , SNI , RNI and RLI are given in Table 1 . SY was significantly correlated with IP , SS and SNI , while the coefficients of SY with RNI and RLI were negligible . The result indicated that IP , SS and SNI are important contributors to SY , and RNI and RLI are of minor importance . Coefficients between SS and SNI and between RNI and RLI were both high while those for SNI with RNI and RLI were low although significant . Path coefficient analysis separated correlation coefficients among SY and its components into direct and indirect effects in Figure 1 . IP and SS had the largest positive and direct effects on SY . It is evident in Fig .1 that SNI had a high indirect effect on SY via SS . A large residual indicated that other traits contributed to SY than those included .

Table 1 *Phenotypic correlation coefficients for seed yield and its components of* 56 *half-sib bermudagrass families .*

Trait	IP	SS	SNI	RNI	RLI
SY	0 .517**	0 .476**	0 .444**	0 .034	-0 .014
IP		0 .241**	0 .198**	0 .000	-0 .085
SS			0 .952**	0 .017	0 .014
SNI				0 .186**	0 .224**
RNI					0 .720**

** Significance at the probability level of 0 .01 .

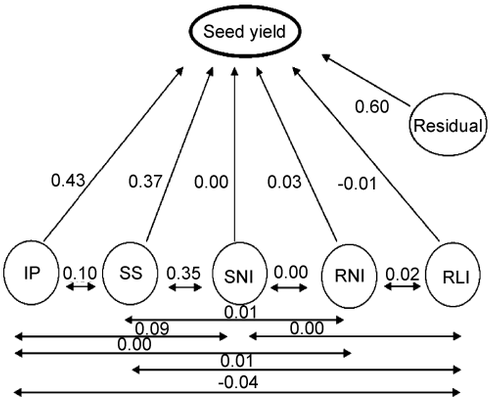

Figure 1 *A path diagram showing cause and effect relationships of five seed yield components and seed yield in bermudagrass . One-directional arrows (→) represent direct path (P) , and two-directional arrows (↔) represent mutual correlations .*

Conclusions Inflorescence prolificacy and seed set percentage had the largest positive and direct effects on seed yield , indicating that selection for increased inflorescence prolificacy and seed set should improve seed yield in bermudagrass .

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