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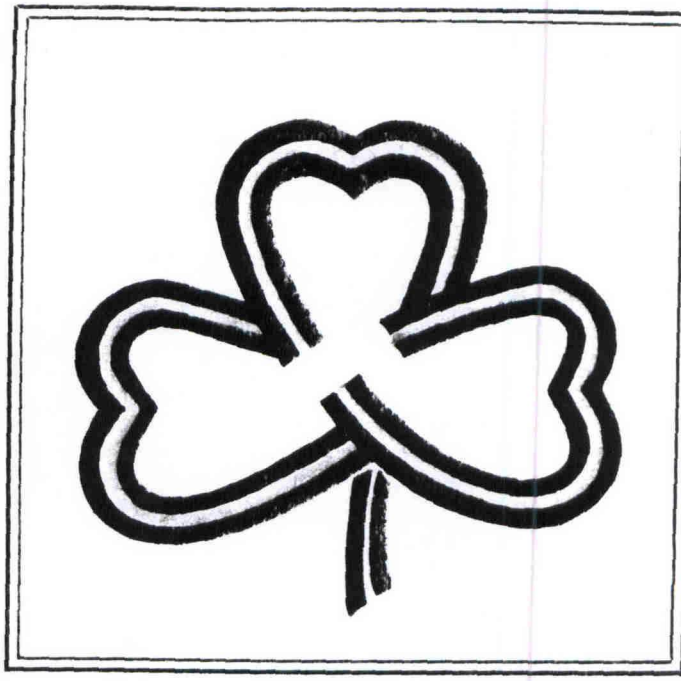
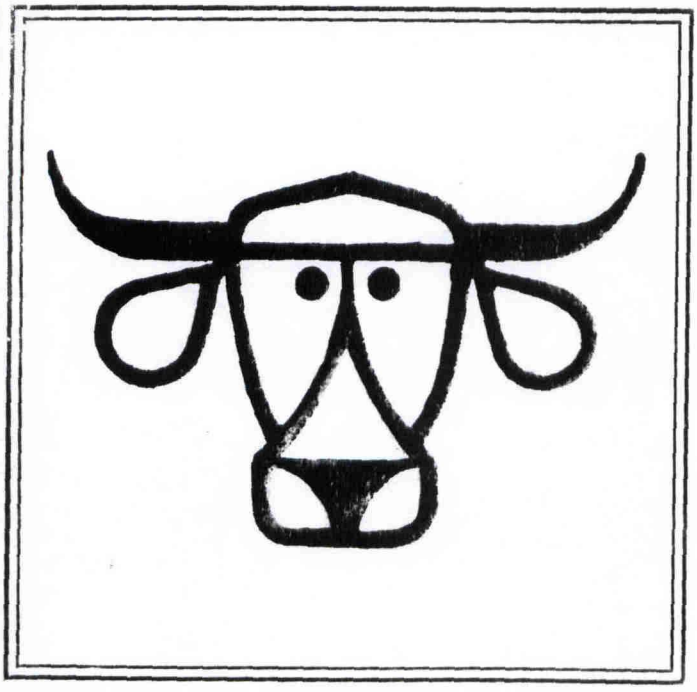
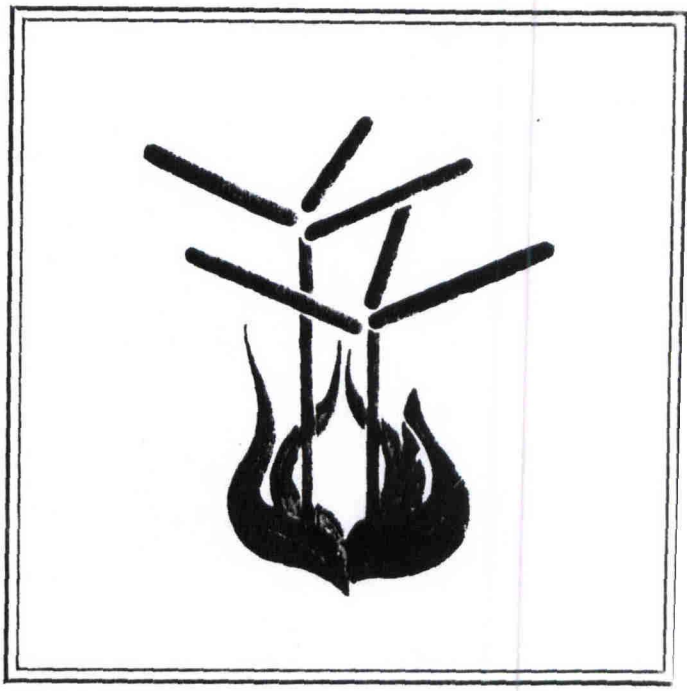
The Texas Agricultural Experiment Station, Neville P. Clarke, Director, The Texas A&M University System, College Station, Texas







Forage Research in Texas

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CV-0024

Project: H 6324 & H 1623
Workers: E. R. Shipe & F. M. Rouquette, Jr.

EVALUATION OF 523 PLANT INTRODUCTIONS OF TRIFOLIUM SPP.

SUMMARY

Field evaluations of 523 genetically diverse Trifolium spp. (true clovers) were made as the first step in a selection program designed to identify species and types with improved agronomic characteristics for East Texas. The Plant Introductions (PI) were rated for stand establishment, seedling vigor, and growth rate. Means and standard deviations were determined for these traits as well as for a composite score. Both species and individual PI's were compared for each of the three ratings. In addition, correlation coefficients were calculated for each of the three traits versus the composite score to determine which was most closely related to overall agronomic fitness. Trifolium dasyurum, T. michelianum, and T. palestinum had the highest composite ratings among species. The stand rating was most closely correlated to the composite score (0.89), but each of the three correlations were highly significant.

OBJECTIVE

To evaluate 523 Plant Introductions in 74 annual Trifolium spp. and identify types having potential for development through a breeding program.

PROCEDURES

All 523 Plant Introductions (PI) were hand-planted in single rows 12 feet in length and 20 inches apart. Fertilizer was applied at the rate of 25-100-100 lbs/acre of N-P_2O_5-K_2O at planting. Although plantings were made on November 5, the first rating was not made until March 9 because of unfavorable weather conditions for germination and growth. Those parameters evaluated were stand establishment, seedling vigor, and relative growth rate. Each entry was rated against all other entries. Ratings were made by two individuals at each date. The rating scale and other evaluation procedures are shown in Table 1. Since only 423 PI's survived in sufficient quantity for ratings, n-values of 423 are shown in the appropriate tables.

Keyword - Trifolium, PI

RESULTS

Out of a total of 74 Trifolium species, Table 2 shows those species (22) that had five or more Plant Introduction (PI) entries. Trifolium resupinatum and T. subterraneum, collectively, made up about 25% of the PI's. Since only 423 PI's had sufficient survival for ratings, Tables 3-8 are based on this n-value. Table 3 presents scoring data of the top ten species with regard to stand establishment. Any specie that had a mean rating that was greater than one standard deviation (SD) indicated that this particular PI was in the top 16% of all plants evaluated. The mean score of all 423 PI's evaluated for stand establishment was 5.7.

Table 4 shows the ten highest scoring PI's for seedling vigor. With a mean score value of 2.9 for all entries, the scores for these ten species were decidedly superior. Relative growth rate scores are shown in Table 5. There were 41 PI's out of the top ten species that had scores of 4.5 or higher. Trifolium dasyurum and T. alexandrinum, which were highly ranked in seedling vigor, were also among the top species for growth rate. Table 6 shows the composite scores for the highest scoring species. Each composite score is an average of the ratings for stand establishment, seedling vigor, and growth rate. The mean score presented is the average of those PI's which ranked higher than one standard deviation. Table 7 shows a similar composite scoring except that all PI scores in a species were averaged. Only T. diffusum has a sizable number of PI's from which the mean score was obtained. This suggests that most of the PI's in T. diffusum ranked high in the individual agronomic traits. Table 8 shows the specie and individual PI's that had composite scores greater than two standard deviations. These PI's were among the top 2.3% of the 423 PI's evaluated. Therefore, from all the scoring data taken, these 14 PI's have emerged as having relatively good agronomic traits and potential for further evaluation for the ultimate purpose of an improved variety.

Table 1. Evaluation procedures used in rating Trifolium spp.

PARAMETER	RATING SCALE*
Stand establishment†	0 (no plants) - 10 (dense stand)
Seedling vigor†	1 (chlorotic, slow growing) - 10 (vigorous growth)
Relative growth rate††	1 - 10 (entries showing most forage receive a score of 10)

†Rated March 9

††Rated March 9, April 19, and May 23

*Each entry rated against all others. Ratings made by two individuals.

Table 2. Trifolium spp. with five or more Plant Introduction (PI) entries.

SPECIES	NO. OF PI's	SPECIES	NO. OF PI's
T. alexandrinum	27	*T. lappaceum*	23
T. arvense	7	*T. nigrescens*	21
T. balansae	5	*T. pallidum*	10
T. campestre	28	*T. parviflorum*	6
T. cherleri	30	*T. pauciflorum*	16
T. diffusum	11	*T. pratense*	5
T. globosum	6	*T. resupinatum*	90
T. glomeratum	11	*T. smyrenaeum*	5
T. hirtum	39	*T. spumosum*	7
T. hybridum	6	*T. striatum*	5
T. incarnatum	6	*T. subterraneum*	48

TOTAL - 74 species, 523 PI's

Table 3. Stand establishment ratings of top ten species.

SPECIES	NO. PI's >1 SD/TOTAL NO.	MEAN SCORE
T. leucanthum	1/1	10.0
T. ligusticum	1/2	10.0
T. palestinum	1/1	10.0
T. smyrenaeum	2/5	9.8
T. michelianum	4/4	9.6
T. pallidum	2/7	9.6
T. lagopus	1/4	9.5
T. lappaceum	7/23	9.4
T. hirtum	18/38	9.3
T. incarnatum	1/6	9.3

n = 423 $\bar{x}$ = 5.7 SD = 2.7

Table 4. Seedling vigor ratings of top ten species.

SPECIES	NO. PI's >1 SD/TOTAL NO.	MEAN SCORE
T. dasyurum	1/1	9.5
T. michelianum	4/4	8.7
T. palestinum	1/1	8.5
T. diffusum	10/11	8.0
T. agrarium	1/3	7.5
T. alexandrinum	1/6	7.5
T. leucanthum	1/1	7.0
T. radiosum	1/2	6.8
T. balansae	3/5	6.7
T. chilense	1/1	6.5

$\bar{x}$ = 2.9 SD = 1.6

Table 5. Relative growth rate ratings of top ten species.

SPECIES	NO. PI's >1 SD/TOTAL NO.	MEAN SCORE
T. dasyurum	1/1	8.8
T. alexandrinum	1/6	8.1
T. diffusum	9/11	6.9
T. balansae	3/5	6.5
T. michelianum	4/4	6.2
T. hirtum	17/38	5.4
T. palestinum	1/1	5.3
T. agrarium	1/3	5.0
T. pallidum	3/7	4.6
T. nigrescens	1/20	4.5

$\bar{x}$ = 2.3 SD = 1.7

Table 6. Composite scores of top ten species.

SPECIES	NO. PI's >1 SD/TOTAL NO.	MEAN SCORE
T. dasyurum	1/1	8.9
T. michelianum	4/4	8.2
T. palestinum	1/1	7.9
T. diffusum	9/11	7.7
T. alexandrinum	1/6	6.9
T. pallidum	2/7	6.9
T. balansae	3/5	6.8
T. leucanthum	1/1	6.5
T. campestre	3/25	6.4
T. smyrenaeum	2/5	6.4

$\bar{x}$ = 3.6 SD = 1.8

Table 7. Plant Introductions with composite scores greater than one standard deviation above the mean score.

SPECIES	NO. OF PI's	MEAN SCORE
T. dasyurum	1	8.9
T. michelianum	4	8.2
T. palestinum	1	7.9
T. diffusum	11	6.8
T. leucanthum	1	6.5

Table 8. Plant Introduction composite scores greater than two standard deviations above the mean score.

SPECIES	PI NO.	SCORE
T. diffusum	120219	9.4
T. michelianum	120136	9.1
T. diffusum	120144	9.0
T. dasyurum	263248	8.9
T. diffusum	120218	8.7
T. michelianum	120249	8.5
T. michelianum	201210	8.1
T. diffusum	BN-9539-62	7.9
T. diffusum	369032	7.9
T. palestinum	233279	7.9
T. hirtum	311485	7.8
T. balansae	168634	7.3
T. resupinatum	198737	7.3
T. hirtum	311483	7.2