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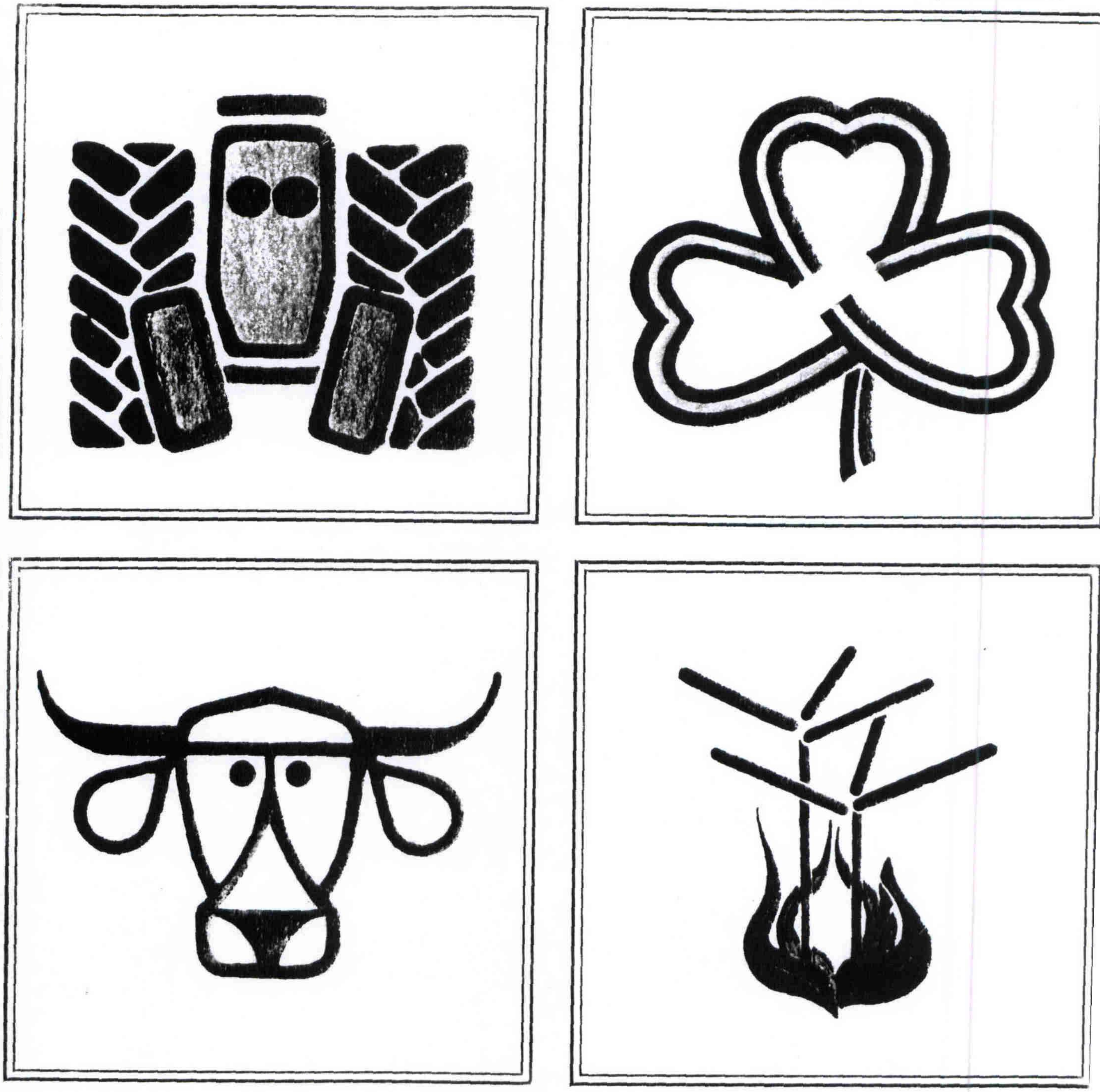
The Texas Agricultural Experiment Station Neville P. Clarke, Director, The Texas A&M University System College Station, Texas



Forage Research in Texas

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THE EVALUATION OF HARDINGGRASS

POPULATIONS FOR SEEDLING VIGOR

OBJECTIVE:

To improve seedling vigor in hardinggrass. Hardinggrass is frequently lost in the seedling stage due to low temperature stress and/or moisture stress. A more vigorous seedling might avoid the stress by early development or reduce the period of stress.

PROCEDURE:

Seed of selected sources varying in seed size were germinated in "Grow-pouches" in the laboratory and primary root, coleoptile and shoot length measured. The same sources were planted in soil and a potting mixture at varying depths to determine maximum planting depth and the best test medium. Finally, 100 seed each from 264 individual plants were planted in soil in the grenhouse at 11 cm depth and emergence noted through 14 days post planting. These studies are based on the thesis that ability to emerge from deep planting is indicative of seedling vigor.

RESULTS:

Neither primary root length nor coleoptile length were related to seed size (Table 1). Seed size has been used in some studies as an indication of seedling vigor. Shoot length and shoot + coleoptile length were positively related to seed size. These data indicate some possibility of using seed size as an index for seedling vigor and possibly for the ability to emerge from deeper depths.

The shoot + coleoptile lengths in Table 1 indicate the potential of emergence from depths of 60 to 90 mm. Seed were planted in two mediums at depths up to 14 cm. Better emergence occurred from a clay loam soil than from an artificial potting mixture (Table 2). Emergence decreased as planting depth increased up to a planting depth of 11 cm. No emergence occurred from 14 cm. There appeared to be no relationship of emergence rate to seed size.

Seedlings were removed from selected planting depths in soil and primary root, coleoptile and shoot lengths measured (Table 3). There was some tendency for primary root length to decrease as seed weight decreased. Neither coleoptile nor shoot length were related to seed size nor were there any consistent differences between planting depths of 8 and 11 cm.

Seed planted at 11 cm depth in a clay loam soil in the greenhouse showed some emergence on the 8th day. Approximately 1% had emerged by the 9th day. Some 120 sources showed 1% or more emergence in 11 days and 15 sources exceeded 15% emergence by that date. Maximum emergence in 11 days was 37% but at least one source reached 48% in 14 days.

The relationship of emergence percent to seed weight is shown in Figure 1. Not much relationship is indicated. The largest seed (177 mg/100 seed) showed 6% emergence, while the highest emergence (37%) was with 142 mg/100 seed. Seed weight ranged from 113 mg/100 seed to 177 mg/100 seed or a 57% difference.

We have selected the earliest emerging seedlings from the sources showing the greatest total emergence. These are being intercrossed and the resulting seed will be used for both deep emergence tests in comparison with TAM Wintergreen and also seedling vigor as indicated by shoot weight following emergence from a normal planting depth (1 - 2 cm).

The preliminary studies indicated that seed weight might be related to seedling shoot development and that selection for seed weight might be an effective approach to improving seedling vigor. The deep planting study indicates little, if any, advantage of larger seed for emergence. Similar results have been obtained in Kleingrass. Thus, ability to emerge from a deep depth may not be indicative of seedling vigor. Rate of emergence was not related to seed size in Kleingrass. There appear to be differences in rate of emergence in hardinggrass. Our studies have not yet determined whether these differences are related to seed size. Obviously early emergence should improve seedling vigor if the latter is recorded as seedling development at a fixed post planting date.

Table 1. Hardinggrass seedling development ("Grow Pouch") in the Laboratory, 14 days post planting.

Accession	Seed Wt. mg/100 seed	Length (mm) Primary Root	Coleoptile	Shoot	Shoot + Coleoptile
20.9	153.3	44.7	38.0	53.9	91.9
1-62	140.7	31.3	30.7	46.3	77.0
16-11	125.6	40.4	42.1	43.5	85.6
18-5	117.0	39.5	33.2	30.5	63.7

Table 2. Influence of genotype, planting depth and medium on hardinggrass emergence (5) (plastic tubes in laboratory), 19 days post planting.

Genotype	Seed Wt. Mg/100 Seed	Planting depth (cm) 5	8	11	14	Average
		Brady Soil				
20-9	153.3	57	23	10	0	22.5
1-62	140.7	43	17	0	0	15.0
16-11	125.6	47	23	10	0	20.0
18.5	117.0	23	30	7	0	15.0
Average		42.5	23.2	6.8	0	18.1
		'Redi-Earth' Potting Mixture				
20-9	153.3	50	20	0	0	17.5
1-62	140.7	87	23	0	0	27.5
16-11	125.6	83	17	3	0	23.2
18-5	117.0	67	7	0	0	21.7
Average		72.0	16.8	0.8	0	21.7

Table 3. The influence of genotype and planting depth in Brady soil on primary root and coleoptile length and shoot extension above the coleoptile (plastic tubes in laboratory), 24 days past planting.

Accession	Seed Wt. MG/100 Seed	Planting Depth cm.	Length (mm) Primary Root	Coleoptile	Shoot Extension
20-9	153.3	8	24	40	26
		11	58	43	
1-62	140.7	8	18	20	29
		11	16	26	33
16-11	125.6	8	17	44	
18-5	117.0	8	11	36	28
		11	15	48	24

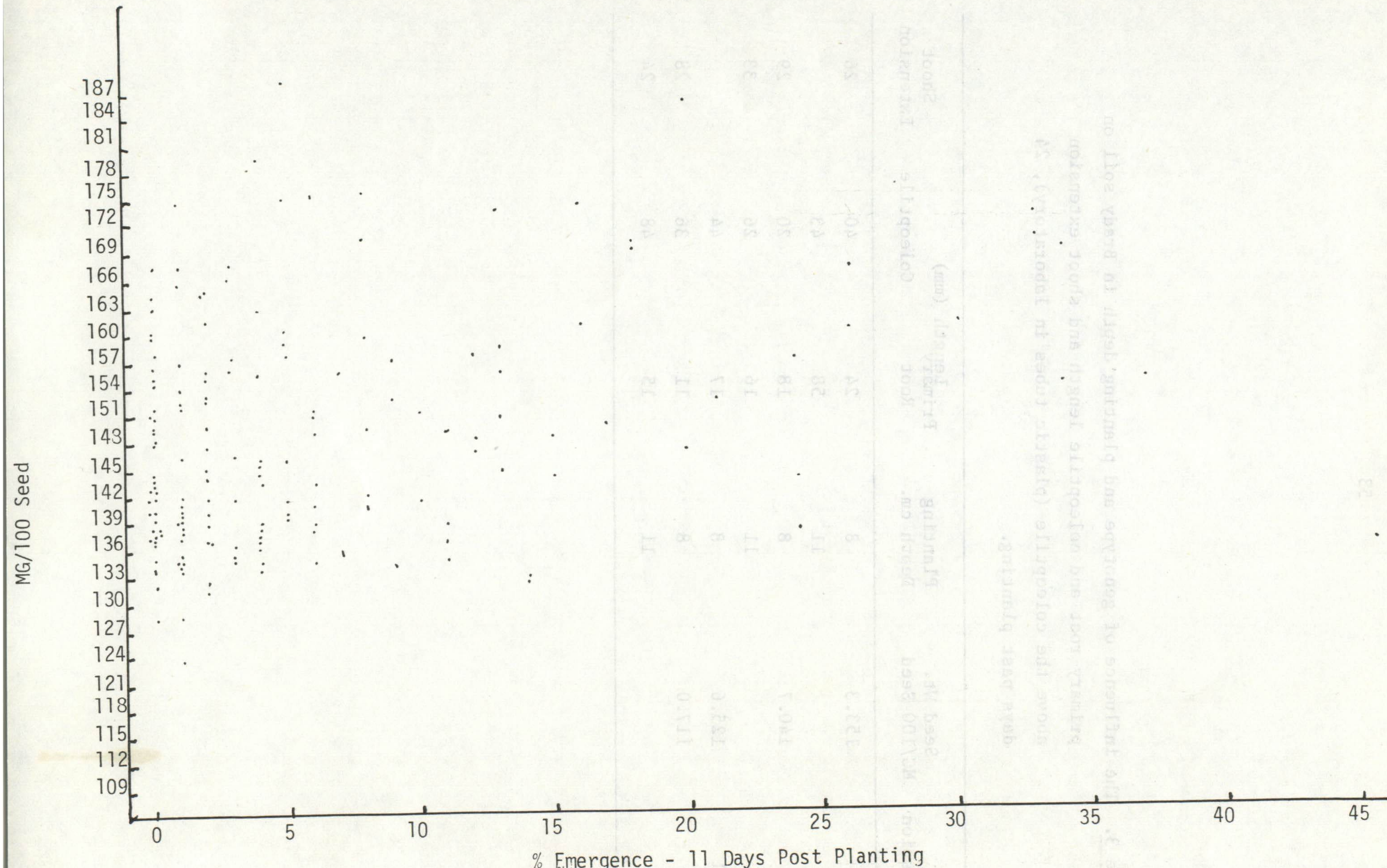

Figure 1. The relationship of seed weight to emergence from deep planting in hardinggrass (planted in Brady soil in greenhouse).