B-10: The effect of different light levels on the shoot:root ratio of *Brachiaria brizantha*

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Maximum sustainable productivity can be achieved by integrating intensive livestock keeping with crop production and agroforestry. Home gardens and plantation crops are the potential areas to integrate with livestock in developing countries where cash and food crops receive priority over forage crops under land limiting conditions. However, the successful exploitation of this resource requires the use of suitable shade tolerant forage species. The shoot:root ratio is an important parameter in determining the shade tolerance and the sustainability of grasses under shade. Therefore the present study was conducted to investigate the effect of shade on the shoot:root ratio of palisade grass (*Brachiaria brizantha* (Hochst. Ex A. Rich.) Stapf.) which is ranked as a shade tolerant plant and the broad sense heritability of shoot:root ratio.

The experiment was conducted at the Research Farm, University of Ruhuna. Two Sri Lankan accessions of palisade grass, 5 from South Africa, 1 from Zimbabwe, 1 from Australia, 1 from USA and 9 from Centro International de Agriculture Tropicale (CIAT), Cali, Colombia were included in the study. All these accessions exhibited marked morphological differences. All the accessions were tested at 3 light levels in a randomized complete block design with 3 replicates in each case. The light levels were 100% (full sunlight), 64% (under 35 years old coconut plantation) and 28% (under 24 years old rubber plantation) of the full sunlight. Following land preparation, the tillers

that were uniform in size and age were hand planted in 2m x 2m plots. The spacing between plants was 12 cm. Recommended doses of fertilizer was applied before planting and at each regrowth cycle. After the initial clearing cut at 4 months of establishment to equalize the pasture, subsequent harvests up to the 4th were carried out at 8 weeks intervals. There random competitive plants from each plot were carefully uprooted, washed, separated into shoots and roots and dried to determine the shoot : root ratio at each harvest.

The data was analysed for harvest effects, light effects and their interaction effects by analysis of variance (nested design).

The analysis of variance revealed a high degree of precision in the data, with significant differences associated with light levels and accessions. Harvest effects on shoot : root ratio were not significant. Harvests x light levels and harvest x accessions interactions were not significant. However, accessions x light levels interactions was significant at $p < 0.01$. The shoot : root ratio has consistently increased with the increase of shade. The highest shoot : root ratio was observed in clone CIAT 6387. The lowest value of shoot: root ratio was observed in PI 292185. The effect of shade on the shoot: root ratio was inconsistent between species. The smallest difference in shoot: root ratio between different light transmission levels was observed in PI 292185. Broad sense heritability of shoot:root ratio was only 0.26.

The carbohydrate reserves in the roots are important for new bud development. The capacity for accumulation of carbohydrate reserves in tropical grasses is generally low, and this capacity is further diminished under shade. Therefore selection of grasses with low shoot:root ratio under shaded conditions is very important to have sustainable pastures under shade. These grasses may be more tolerant of high grazing pressure and they may be more persistent under dense shade than grasses with high shoot:root ratio that maximize leaf area production. The low heritability broad sense of shoot : root ratio indicates that the selection within a species may be not successful. Therefore, attention should be focused to identify grass species with low shoot : root ratio in order to obtain persistent pastures under shade.