PhD

ZERO GRAZED PASTURE UNDER YOUNG RUBBER (*Hevea brasiliensis*)

By

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ABSTRACT

This study examined the feasibility of growing cut and carry pastures under young rubber. The aspects investigated were productivity and species selection, nutritional aspects in relation to application of fertilizers to grass, legume grass compatibility and dry matter yields of mixed swards, competition of grass and legume grown under young rubber trees. Aspects of pasture establishment, systems of planting and dry matter in relation to plant density and certain ecological factors were also studied.

Nine field experiments were laid out at four different sites. Three at Pembroke State Plantation, one at Dartonfield Estate, three at Eladuwa State Plantation and two at Hadigalla State Plantation, all in the Kalutara District.

Nitrogen showed a linear increasing response in dry matter production of grass to increasing levels of applied nitrogen up to about 350 kg N/ha/yr and potassium also showed

such linear responses but increase of grass DM/kg K was less than grass DM/kg N. There was no response in grass dry matter production to either the source or level of application of phosphorus. There were certain indications of N,P,K interactions.

Different grass species responded differently to application of mitrogen. A 30-day defoliation interval secured the highest dry matter yields and nutritive value in grass. Fertilizers applied little and often gave higher yields than larger doses at longer intervals.

Legume-based pastures were more productive than pure grass pastures. Indication of fixed nitrogen contribution to grass by legumes were seen. Less weed competetion in mixed swards was evident. Stylosanthes guanensis had higher dry matter yields than Pueraria phaseoloides and Centrosema pubescens.

Panicum maximum cv Guinea b and Bracharia ruziziensis competed with all five clones of Hevea tested reducing their growth. In this instance the more productive grass competed more with the trees. Grass has shown to compete with rubber for soil nitrogen. The dry matter yield of ten grasses tested under Hevea gave dry matter yields in descending order of Panicum maximum cv Guinea a, Guinea b, Paspalum plicatulum, Setaria sphacelata, Bracharia decumbens, Bracharia brizantha, Bracharia ruziziensis, Bracharia milliformis, Pennisetum purpureum and Panicum maximum var trichoglume cv greenpanic.

The rate of competition of 10 species of grass grown under Havea in the descending order were B.brizantha, B.decumbens, P.maximum cv Guinea b, P.purpureum, P.maximum cv Guinea a, P.phaseoloides(legume), B.ruziziensis, B.milliformis, P.plicatulum, S.sphacelata, P.maximum cv greenpanic.

The productive vigour and competitiveness of grasses with Hevea was not closely related. Therefore it is possible to plant species such as P.plicatulum, S.sphacelata and B.milliformis for interplanting with rubber. Grass and legume compete with Hevea when planted close to the trees and should be planted at best 2m away from the base of the trees.

The highest yields were obtained with a spacing of 0.15x0.30 m in grass. Methods of zero tillage with herbicides gave higher rates of grass establishment. The dry matter production of grass is conditioned by high night temperature, high morning relative humidity, and increased clear sunshine hours. Rainfall did not show a close relationship with dry matter production of grass.

P.plicatulum and S.guyanensis cvs schofield or fine stem oxley could be the best species of grass and legume for intercropping under young rubber in the future. The grass and legume could be grown in alternate rows about 2m from the base of the tree. The trees are best planted at a spacing of 9.1x2.4 m. The pasture has to be fertilized with 90-100 kg P/ha/yr and about 135 kg k/ha/yr. No nitrogen is necessary for such a mixed sward. But the rubber trees have to be fertilized heavily over and above their normal needs. Such a mixed pasture sward would supply 25,000-30,000 kg DM/ha/yr provided it is defoliated monthly at 13-20 cm above ground. Pasture/tree competition could be avoided some more probably if pasture is irrigated during the dry periods.

Implications of this work are discussed.

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