INITIAL GROWTH AND NODULES DEVELOPMENT IN *GLIRICIDIA SEPIUM*

J. Kayode[1]

Abstract

The initial growth and nodules development in *Gliricidia sepium* were assessed in three different soil samples obtained from fertile, cultivated and degraded lands. The species germinated in all the three soil samples. Germination was most rapid in the fallow soil. Also the records of the seedling heights kept for three months indicated that increase in heights was most rapid in the fallow soil. However, there was no significant difference in the heights of the seedlings from the three soil samples at 5% level. Nodulation occurs in seedlings growing in the three soil samples.

Introduction

The role of trees in maintaining and improving soil productivity had been demonstrated by a number of scientists. However, recent initiatives now focus on the use of nitrogen fixing trees (NFT) species that have been found to fix more nitrogen than grain legumes and provide more nitrogen to soil through a larger biomass yields Kadiata and Mulongoy, 1992.

Presently in Nigeria, a dearth of studies still abounds on the growth and nodules development of most NFT species. Such species include *Gliricidia sepium*, a multipurpose NFT species of the sub-family Papilionoideae, native of South and Central America, which have been used extensively in Agroforestry and community forestry programs (Agboola *et al.*, 1981; Ngulube, 1990; Ngulube and Lusayo, 1991). Its wood is good for fuel with a heating value of 4900 kcal/kg (MacDicken, 1998). It is also useful for shade and ornamentals. Also the species is fast growing, easy to establish, cultivate and manage on different sites. Anon (1980), Falvey, (1982). The study being reported is aimed at evaluating the initial growth and nodules development in *Gliricidia sepium* in soil samples of a southwestern Nigeria location.

Materials and Methods

The Study Area

Ado-Ekiti (7°40'N, 5°15'E) has a tropical, humid and hot climate with a bimodal rainfall pattern. The rain season lasts from March to November with a short dry spell in August. The hot dry season lasts from November to February. It enjoys abundant rainfall of over 1450 mm annually and the town is 400m above

[1] Department of Plant Sciences, University of Ado-Ekiti, Ado-Ekiti, Nigeria

sea level (Kayode and Faluyi, 1994). The soil in the study area has also been described as overlying metamorphic rocks of basement complex, which show variation in size and mineral composition (Smith and Montogmerry, 1962).

Methods

Soil samples were collected at 10cm depth from three sites, a fallow land, cultivated farmland and a degraded land. Each of the soil samples was fed into 30 planting pots. Five seeds of *G. sepium* were planted at a depth of 2cm in each pot. The pots were watered very early in the morning or late in the evening everyday. Seedling germination was observed and the coefficients of velocity (C.O.V) of the species in the soil samples were determined according to Chaco and Singh (1966) and Kayode (2000) as:

$$C.O.V = \frac{A_1 + A_2 + A_3 \ldots\ldots\ldots\ldots + A_{12}}{A_1T_1 + A_2T_2 + \ldots\ldots\ldots + A_{12}T_{12}}$$

Where A is the number of seeds germinating
and T is the time corresponding to A.

Records of the seedlings height were kept for 3 months after which the plants were harvested and separated into shoots, roots and nodules. The fresh and dry weights of the component parts were determined. Nodulation index, which accounts for the effect of plant size on nodules mass, was determined after Hughes and Herridge (1989) as:

$$\text{Nodulation Index} = \frac{\text{Nodules mass}}{\text{Shoot mass}} \times 100$$

Data obtained were subjected to statistical analysis.

Results and Discussion

Seeds of *Gliricidia sepium* germinated in all the soil samples. The rate of germination was most rapid in the fallow soil sample while the least was observed in the degraded soil sample. All the seedlings showed a monthly increase in heights. The increase in heights tends to be most rapid in the seedlings from fallow soil than those from the cultivated and the degraded soils (Tab 1). However, statistical analyses (t-test) at 5% level revealed that the rate of increase in heights seedlings from the three soil samples were not significantly different from one another. Seedling heights obtained from the soil samples compared favourably with those obtained from other nitrogen fixing tree species by previous researchers such as Gutteridge and Akkaesang (1985) and Ogboghodo (1998).

Biomass production revealed that the species nodulated (Table 2) in all the soil samples thus suggesting that *Gliricidia sepium* possessed the ability to form nodules with the native Rhizobia present in the soil samples (Table 2). Previous studies conducted elsewhere in other parts of southwestern Nigeria to which this study site belongs by Kadiata and Mulongoy (1992) had also revealed that *G. sepium* nodulated abundantly. It develops lateral roots and active nodules at its early growth stage (Ezenwa and Atta-Krah, 1990). These attributes are being suggested as the features that enhanced this species to establish easily in both fertile and degraded soils. Its nitrogen fixing ability provides a continuous supply of nitrogen fo. plant growth (Franco and Faria, 1997) and its abundant nodulation has been suggested as a good i..dicator of the establishment of organic phosphorus pool (Franco *et al.*, 1994). Phosphorus is another limiting nutrient in degraded soils.

Table 1. Seedling heights of *Gliricidia sepium* in different soil samples

Soil Sample	Seedling heights (cm)/month				C.O.V (%)
	1	2	3	4	
Fallow	3.7	12.9	26.4	37.5	17.7
Cultivated	3.9	15.0	23.5	34,3	16.6
Degraded	3.2	10.6	23.3	30.6	13.5

Table 2. Biomass production of *Gliricidia sepium* in different soil samples

Soil Sample	Dry weights of Plant Parts*			Nodulation Index
	Roots	Shoots	Nodules	
Fallow	2.0c	4.4c	0.12b	2.1
Cultivated	1.9b	3.0b	0.12b	4.4
Degraded	2.1a	3.7a	0.14a	3.7

* Values in the same column followed by different letters differ by the Duncan's Multiple range test at 5%.

Acknowledgement

Thanks are due to the New Forest Foundation of United States of America for the generous donation of the seeds used in this study and Gladys Kayode for assistance with fieldwork and useful advice.

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