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# Effect of depth of root pruning and coppicing height of *Gliricidia sepium* on growth, yield and economics of *Rabi* sorghum in alley cropping system

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## ABSTRACT

**Field experiment was conducted at Regional Agricultural Research Station, UAS Campus, Bijapur on deep black soil to study the effect of depth of root pruning and coppicing height of *Gliricidia sepium* on growth, yield and economics of *Rabi* sorghum in alley cropping system. Among depth of root pruning, pruning at 45 cm depth found beneficial in higher plant height, length and width of earhead of *Rabi* sorghum. The grain and stover yield of *Rabi* sorghum were significantly maximum in 45 cm depth of root pruning (1047.7 and 1677.5 kg ha$^{-1}$, respectively). Among coppice height, coppicing at 20 cm height noticed higher growth and yield attributes. The significantly maximum grain and stover yield were recorded by 20 cm coppicing height (1019.0 and 1529.5 kg ha$^{-1}$, respectively) and also same treatments were shown higher net returns and B:C ratio. However, none of interaction effect found to significant.**

**Key words :** Agroforestry, Alley cropping system, Coppicing, Economics, Root pruning

## INTRODUCTION

Alley cropping is a production system in which trees and shrubs are established in hedge rows on arable crop land with food crops cultivated in the alleys between the hedge row (Kang *et al.*, 1990; Nair *et al.*, 2001). It is one of the most important agroforestry technologies developed in early 1970s at the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria where the term alley cropping was coined (Harold and Warlito, 1985). The prunings are one of the main benefits provided by hedgerows. Therefore, coppicing must be properly understood and managed to optimize biomass production. Hence coppicing height, alley width and root pruning of hedge row species are important aspects. There are conflicting views regarding coppicing height each depend upon many factors like environmental and edaphic conditions and also the management practices.

In an alley cropping system, there will be always competition for underground and above ground resources between the hedge row species and field crop. It is necessary to minimize the competition by creating niche separation through silvicultural manipulation and use of proper plant ideotypes. The silvicultural manipulation like root pruning of hedge row species will minimize the competition between component species for moisture and nutrients. Further, the above ground competition for right can be manipulated by practicing suitable cutting height/ coppice height of hedge row species. The arable crops grown with hedge row species in an alley cropping model tend to interact with each other. There should be niche separation between the arable species and hedge row species for optimization of yield from the system. To achieve such optimization certain silvicultural manipulation like root pruning and coppicing of hedge row species is essential.This is essential to reduce the competition between component species for light, moisture and nutrient.

According to Korwar and Radder (1994) and Gaddanakeri (1991) root pruning of hedge rows increased the grain and stover yield of alley cropped *Rabi* sorghum compared to unpruned. Therefore, keeping in view of identifying alternative hedge row species to replace leucaena and appropriate *Rabi* sorghum variety compatible to the system were to be worked.Also silvicultural manipulations like root pruning and coppicing for *Gliricidia* which is being accepted as an alternative to leucaena in many other regions are also put for verification. In view of the above facts, the present investigation was carried out to study the effect of depth of root pruning and coppicing height of *Gliricidia sepium* on growth, yield and economics of *Rabi* sorghum in alley cropping system.

## MATERIALS AND METHODS

The experiment was conducted at Regional Agricultural Research Station, Bijapur, Farm of University of Agricultural Sciences, Dharwad, Karnataka during *Rabi* season of 2001-02 and 2002-03. The soil of experimental field was medium black soil, having pH 7.9 and EC 0.32 dS m$^{-1}$, 105.0 kg ha$^{-1}$ available Nitrogen, 15.2 kg ha$^{-1}$ available $P_2O_5$, 398.0 kg ha$^{-1}$ available $K_2O$ and 0.45% organic carbon. The present experiment was

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