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PRODUCTION POTENTIAL OF BERSEEM IN *EUCALYPTUS* BASED AGRO-SILVICULTURAL SYSTEM IN BUNDELKHAND REGION (U.P.) INDIA

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ABSTRACT

The field study was conducted in a private Agro-forestry Farm at Aata in district Jalaun (U.P.). The sowing of berseem (*Trifolium alexendrinum* L.) var. Verdan was done during the rabi season in 3 years old *Eucalyptus* planted at 6x2 m spacing and at the same time the crop was also sown in the adjacent field devoid of trees (control). The data recorded on plant height, stem diameter, yield and economics revealed that no doubt all these parameters were heigh in case of sole crops of berseem but if we consider the need of the farmer that requires regular income from his piece of land then it seemed practical that berseem as fodder could be grown successfully in standing Eucalyptus with additional income of Rs. 3219/ha.

Figure : 00 References : 05 Tables : 03

KEY WORDS : Agri-silviculture, Allelopathic, *Eucalyptus, Trifolium alexendrinum.*

Introduction

About 70 per cent of the people live in villages. Their livelihood is dependent mainly on agriculture and animal husbandry. Increase in food production is of prime importance but at the same time scientists are also worried about the degrading soil health, moreover in country like India. Under the situation of scarcity of land, capital resources and less productivity of labour, agro-forestry may be an ideal option for improving resource efficiency. Small land holdings have inherent constraints being lack of resources at the disposal of farmers. As *Eucalyptus* as multipurpose plant having its vital role in bio-drainage, *Eucalyptus* plantation is likely to be adopted in large scale on government and private lands. Agro-forestry intervention can overcome these problems to a great extent. Therefore, this study was planned to find out the production potential of berseem in *Eucalyptus* based agri-silvicultural system. \

Materials and Methods

The experiment was carried out at private agro-forestry farm, Aata, Orai located 26^0 59' N lat. and 79^0 37' E long. above msl 141.6 m in the western part of Bundelkhand region (U.P.), India. The study was conducted during the month of July, 2012 to June, 2013. The meteorological data, namely, average maximum temperature, minimum temperature, humidity, photoperiod and rainfall were recorded during the field experiment.

The average minimum and maximum

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TABLE-1 : Effect of *Eucalyptus* on plant height (cm) of berseem

Plant height at	With *Eucalyptus*	Without *Eucalyptus*	Paired t-test value
1st cut	23.4 ± 0.43	40.1 ± 0.52	38.10*
2nd cut	33.2 ± 1.68	39.1 ± 1.39	6.21*
3rd cut	25.8 ± 0.89	41.0 ± 0.89	17.16*

temperature recorded during the field experiment was 18.87^{0}C and 34.41^{0}C respectively. Peak minimum and maximum temperatures were 6.3^{0}C in December and 45.5^{0}c in May. Average relative humidity was 53.61 percent and mean photoperiod of 13.12 hr was observed. The average annual rainfall was 1012.5 mm.

The soil was sandy loam and slightly alkaline (pH 7.6) with 0.38 percent organic carbon, electrical conductivity 0.16 mm mos, available nitrogen 287 kg/ha, available phosphorus 26 kg/ha and available potash 356 kg/ha.

During experimental procedure sowing of berseem was done on 2nd week of October in a three years old *Eucalyptus* planted at 6x2 m spacing and at the same time the crop was also sown in the adjacent field devoid of trees (control). Half of the recommended dose of nitrogen and full dose of phosphorus was applied before sowing. Crops were irrigated at 15 days interval.

Plant height was taken from five plants from each plot with the help of meter scale before each cut. Data on stem diameter were recorded from basal stem of same plants used for recording plant height with the help of digital vernier caliper and expressed in millimeter. Fodder yield was calculated by adding the fodder yield of all the cuttings and expressed in quintal per hectare.

Results and Discussion

The data presented in Table-1 show that the plant height at each cut in control attained significantly more than under *Eucalyptus*. It was 23.4, 33.2 and 25.8 cm at Ist, 2nd and 3rd cuts, respectively, under *Eucalyptus* and corresponding values of 40.1, 39.1 ad 41.0 cm in respective control.

The data in Table-2 reveal that berseem stem was thin under *Eucalyptus* as compared to control. However, the differences were significant only at 1st and 3rd cut. At 2nd cut also stem diameter of berseem was less under *Eucalyptus,* however, the differences were non-significant.

The yield data of crop *Eucalyptus* and control showed maximum deduction in yield, *i.e.* upto 52.01 per cent and income from crops grown with *Eucalyptus* and without *Eucalyptus* was Rs. 3219 and 6488, respectively (Table 3). The yield under *Eucalyptus* was significantly less than sole crop (contol).

But other advantages of agro-forestry such as protection against erosion, insurance against drought, availability of fuel and fodder and environmental protection are valuable.

Plant height of berseem was less under *Eucalyptus* than control which may be due to reduced light intensity under *Eucalyptus.* The data recorded during the course of field studies in the

TABLE-2 : Effect of *Eucalyptus* on stem diameter (mm) of berseem

Plant diameter at	With *Eucalyptus*	Without *Eucalyptus*	Paired t-test value
1st cut	2.84 ± 0.06	3.71 ± 0.08	12.30*
2nd cut	3.78 ± 0.08	3.80 ± 0.09	3.35*
3rd cut	3.02 ± 0.10	3.94 ± 0.10	8.01*

TABLE-3 : Yield and economics of berseem in agro-forestry and control

	With *Eucalyptus*	Without *Eucalyptus*	Paired t-test value
Yield (q/ha)	86.9	181.1	52.01%
Cost of cultivation (Rs./ha)	31016	31016	-
Income (Rs./ha)	3219	6488	3250

month of December have clearly shown that photosynthetic assimilation rate (PAR) available to test crop under *Eucalyptus* was about half of light available to crops in the control. Thus, more light intensity in control increased the photosynthetic efficiency of crops resulting in better growth as reported earlier[5].

Other workers[2,4] also reported that higher tree density and more suppressing effect on crops through reduced solar radiation on crop canopy and lower availability of nutrients. The poor growth of crops under *Eucalyptus* may be attributed to other factors like root competitions for moisture and nutrients and allelopathic effects of *Eucalyptus*[1,3].

Conclusion

Though the yield of berseem crop in agro-forestry system was about 52% less than control, but loss can be compensated by selling trees at maturity. Additional income can be generated by growing under *Eucalyptus.*

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