

RESEARCH NOTES

(I)

NODULATION IN ROOTED STEM CUTTINGS OF *ACACIA AURICULIFORMIS* A. CUNN. EX. BENTH.

Acacia auriculiformis A. cunn. Ex. Benth. a legume tree crop was introduced to India during 1946. It became popular as a social forestry species because of its tolerance to dry and alkaline soils. The wood is used widely for fuel, pulp and furniture making (Kushalappa, 1991). *A. auriculiformis* is associated with nitrogen fixing bacteria called *Rhizobium* and fixes atmospheric nitrogen through the symbiotic relationship with *Rhizobium*. Since *Rhizobium* present in the soil, it easily infect the roots of *A. auriculiformis* in the field. The *Rhizobium* produces root nodules in the infected *A. auriculiformis* as the sites for nitrogen fixation. However, the rooted stem cuttings of genetically superior clones of *A. auriculiformis* have not formed the root nodules as they propagated in vermiculite. Generally the high yielding and genetically superior trees of *A. auriculiformis* are selected and propagated vegetatively for pulp production. The rooted stem cuttings are usually propagated in vermiculite, an inert media which is devoid of nutrient, soil and microbial factors. Hence, the rooted stem cuttings always depend on water, temperature and humidity for survival. Excess of these factors may also cause damage of rooted stem cuttings by weakening the tissues due to non availability of sufficient nutrients.

Institute of Forest Genetics and Tree Breeding, Coimbatore has developed a new technique to enhance the nitrogen fixation in the rooted stem cuttings of *A. auriculiformis*. The root nodules were collected from well grown *A. auriculiformis* tree and the *Rhizobium* was

isolated and cultured in Yeast Extract Mannitol Agar medium (Table 1). The stem cuttings of *A. auriculiformis* (Fig.1) were rooted in 100 cc root trainers by using 4000 ppm treatment of Indole Butyric Acid (rooting hormone) and maintained under mist chamber conditions for 15 days. After 15 days, 10 ml culture of *Rhizobium* was directly inoculated in the root trainers contains rooted stem cuttings. After inoculation the rooted stem cuttings were maintained in polytunnels with 35°C and 70 % relative humidity. A total of 15 replicates of rooted stem cuttings of *A. auriculiformis* inoculated with *Rhizobium* were maintained in the mist chamber. It was observed that the root nodules (3-5 root nodules/ cutting) have been emerged in the lateral roots by splitting of root cortex in the rooted stem cuttings of *A. auriculiformis* (Fig. 2 & 3) after 30 days of inoculation. 98% of root nodules formation was observed in the rooted stem cuttings. Present observation probably is the first report.

Table 1 : Composition of Yeast Extract Mannitol Agar medium

Ingredients	g/l
K ₂ HPO ₄	0.5
MgSO ₄ ·7H ₂ O	0.2
NaCl	0.1
Mannitol	10.0
Yeast Extract	1.0
Distilled water	1000 ml
Agar	20 g
Congo red solution 1 % solution	2.5 ml

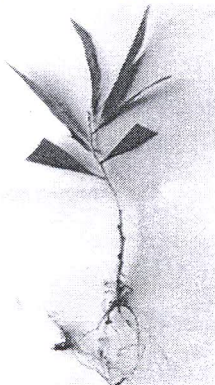
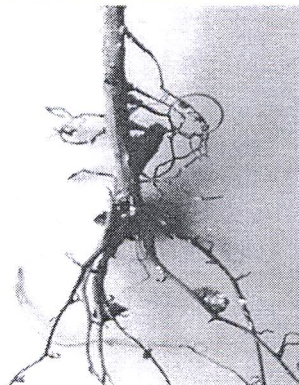
Fig. 1 : *Rhizobium* inoculated rooted stem cutting of *Acacia auriculiformis*.

Fig. 2 : Root nodule formation in rooted cutting.

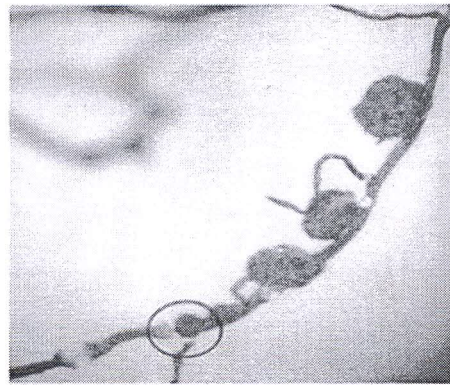


Fig. 3 : Development of root nodules by splitting the root cortex.

There were no earlier studies or reports on formation of root nodules in the rooted stem cuttings of *A. auriculiformis*. However, Karthikeyan *et al.* (2011) achieved root nodules in the rooted stem cuttings of *Casuarina equisetifolia* by inoculation of *Frankia*

Benefits of inoculation of *Rhizobium*

- Early establishment of nitrogen fixation in rooted stem cuttings of *A. auriculiformis*
- Reduction in application of chemical fertilizers
- Improvement of growth, biomass and nutrient uptake.

References

- Kushalappa, K.A. (1991). Performance of *Acacia auriculiformis* in India In: *Advances in tropical Acacia research*. Proceedings of International workshop held in Bangkok, Thailand, Feb 11-15, 1991. Pp 189-193.
- Karthikeyan, A., Sathishkumar, S.R. and Sakthivei, K.M. (2011). Nodulation in *Casuarina equisetifolia* rooted stem cuttings by inoculation of *Frankia*. *Indian Forester*, **137**(9): 1130-1131.

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