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# RESEARCH ARTICLE

## EFFECT OF ARBUSCULAR MYCORHIZAL FUNGI AND BIO INOCULANTS TO SSI CHIP BUDS ON GERMINATION AND SEEDLING VIGOUR IN SUGARCANE

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## ABSTRACT

A nursery experiment was conducted during Dec-Jan 2016 and Dec-Jan 2017 to study the response of Arbuscular mycorhizal fungi and bioinoculants for raising sugarcane chip bud seedlings under shade net at Sugarcane Research Station, Melalathur Tamil Nadu. The study was conducted in a randomised block design with three replications and 13 treatments viz., The different treatments included wereT1: Coir pith medium alone(control), T2: Am Fungi 1gm// Chip bud T3: : Am Fungi 1.5gm/ Chip bud T4: : Am Fungi 2 gm/ Chip bud T5: Azophos 1gm/chip bud T6: Azophos 1.5gm/chip bud, T7: Azophos 2gm/chip bud, T8:*Pseudomonas flurorescens* 0.25gm/chip bud, T9: *Pseudomonas flurorescens* 0.5gm/chip bud, T10; *Pseudomonas flurorescens* 0.75gm/chip bud T11: AM fungi 1 g + Azophos 1gm+*Pseudomonas flurorescens* 0.25gm/chip bud. T12: AM fungi 1 g + Azophos 1.5gm+*Pseudomonas flurorescens* 0.5gm/chip bud. T13: AM fungi 2g + Azophos 2gm+*Pseudomonas flurorescens* 0.75gm/chip bud. The variety used is COG 94077. The germination percentage was recorded on 12days after planting. Growth measurements on root length, shoot length, were recorded on 25 days after planting. The observations on germination, root length, shoot length, were recorded. and seedling vigor was calculated. Among the different treatments tried the chip buds given with the combination of AM fungi 2g + Azophos 2gm+*Pseudomonas flurorescens* 0.75gm/chip bud (T13) recorded the maximum values for germination percentage (88), root length (35.3cm), ,shoot length (38.0cm), and seedling vigour (6450), whereas control recorded lesser values for germination percentage (80), root length (21.0cm), ,shoot length (25.0cm), and seedling vigour (3680).

***Key words:*** AMF, Pseudomonas fluoresesces, Azophos, Germination, Seedling Vigour.



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## INTRODUCTION

Sugarcane seed with high quality utilizing low cost technologies is the need of the hour. Transplanting of settlings raised in polybags offers great advantages in sugarcane production. Nursery raised from sugarcane bud chips and planting them in main field was found to be more economical than traditional methods for seed increase (Rajendra Prasad *et al.,* 2007). The sugar industry is the main livelihood of 35 million farmers in India with an area of 4.2 million ha under cane and a production of 335million tonnes per year. In India the average requirement of seed material is approximately 40 million tonnes (Gujja *et al.,* 2009) With the adoption of chip bud technology there is a possibility of savings of 20 million tonnes of seed cane that could be sent for milling thus benefitting both the farmers and millers .As chip buds have minimum amounts of mother tissue attached to the bud a suitable management technique for developing a healthy seedling is imperative. Soil is the outer weathered portion of the earth's crust .it is called as field soil.

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For growing plants in container the use of pure field soil is not recommended. The soil tends to become compacted which decreases drainage and aeration. In addition soils are heavy and all soils must be sterilized to remove pathogens, nematodes and weeds. For these reasons the soil is usually amended or completely replaced with various organic and inorganic amendments. organic medium amendments usually are derived from plants or plant products that occur naturally or are the byproducts of processing plants or mills (Saw dust, cedar chipps , bark, baggase, ricehulls). The main purpose of using organic amendments is to loosen the soil and to create large pores to increase 1)aeration 2)drainage 3)usable water holding capacity4) nutrient holding capacity5)decrease growing medium weight. Mycorrhizal fungi associated with plant roots are known to increase the efficiency of phosphorus, Zinc, Copper, manganese, Iron, etc., the improved efficiency has been shown fungal species and the soil type used. Although VAM fungi have extremely wide host range the existence of host preference has been suggested by many researchers (Bagyaraj *et al.*, 1989). Borges and Chaney (1988) attributed the varied growth responses in the inoculated Acacia Scleroxyl a seedling due to inherent difference inefficacy and fungal aggressiveness.. Similar responses were recorded in Dalbergia Sissoo, D. Latifolia and Acacia auriculiformis (Sumana 1993).

**Table 1. Effect of Arbuscular mycorhizal fungi and bio inoculants to SSI chip buds on germination and seedling vigour in sugarcane**

| Treatments | Germination percentage | Root length (cm) | Shoot length (cm) | Vigour index |
|---|---|---|---|---|
| $T_1$ | 80 | 21.0 | 25.0 | 3680 |
| $T_2$ | 85 | 26.8 | 30.8 | 4896 |
| $T_3$ | 84 | 28.4 | 26.4 | 4603 |
| $T_4$ | 82 | 28.2 | 29.7 | 4747 |
| $T_5$ | 86 | 33.1 | 28.4 | 5289 |
| $T_6$ | 88 | 28.9 | 30.1 | 5174 |
| $T_7$ | 90 | 28.8 | 35.0 | 5742 |
| $T_8$ | 84 | 30.6 | 30.8 | 5157 |
| $T_9$ | 87 | 32.0 | 34.0 | 5742 |
| $T_{10}$ | 86 | 32.6 | 36.0 | 5899 |
| $T_{11}$ | 88 | 34.0 | 38.0 | 6336 |
| $T_{12}$ | 86 | 34.6 | 39.1 | 6338 |
| $T_{13}$ | 88 | 35.3 | 38.0 | 6450 |
| Sed | 1.6 | 2.2 | 2.3 | 227.8 |
| CD | 3.3 | 4.6 | 4.8 | 470.3 |

The present investigation was aimed to assess the effect of AMF, Pseudomonas flurosences and Azhophos on germination root length, shoot length and vigour index.

## MATERIALS AND METHODS

Chip buds were chipped from healthy 7 months old seed cane and planted in portrays during December to January 2016 and 2017 allowed to grow under shade net. The study was conducted in a randomised block design with three replications and 13 treatments. T1: Coir pith medium alone(control), T2: Am Fungi 1gm/ Chip bud T3: : Am Fungi 1.5gm/ Chip bud T4: : Am Fungi 2 gm/ Chip bud T5: Azophos 1gm/chip bud T6: Azophos 1.5gm/chip bud, T7: Azophos 2gm/chip bud, T8:*Pseudomonas flurorescens* 0.25gm/chip bud, T9: *Pseudomonas flurorescens* 0.5gm/chip bud, T10; *Pseudomonas flurorescens* 0.75gm/chip bud T11: AM fungi 1 g + Azophos 1gm+*Pseudomonas flurorescens* 0.25gm/chip bud. T12: AM fungi 1 g + Azophos 1.5gm+*Pseudomonas flurorescens* 0.5gm/chip bud. T13: AM fungi 2g + Azophos 2gm+*Pseudomonas flurorescens* 0.75gm/chip bud. The variety used is COG 94077. The germination percentage was recorded on 12days after planting, growth measurements on root length, shoot length were recorded on 25 days after planting. The observations on germination,root length, shootlength, were recorded. seedling vigor was calculated.

## RESULTS AND DISCUSSION

Among the different treatments tried the chip buds given with the combination of AM fungi 2g + Azophos 2gm+*Pseudomonas flurorescens* 0.75gm/chip bud (T13) recorded the maximum values for germination percentage (88), root length (35.3cm), shoot length (38.0cm), and seedling vigour (6450), whereas control recorded lesser values for germination percentage (80), root length (21.0cm), ,shoot length (25.0cm), and seedling vigour (3680) (Table 1). The reason for increase in root length is the influence of AMF are able to grow beyond the depletion zones around the plant roots and they are able to increase the uptake of immobile nutrients such as P and also micronutrients resulting in the enhanced growth of sugarcane and yield parameters (Hodge *et al.,* 2001, Hodge *et al.,* 2010). The AMF are able to scavenge the available P through their hypae that have large surface areas on which the extra radical hypae act as a bridge between the soil and sugarcane roots (Liu *et al.,* 2000, Kelly *et al.,* 2001). The volume of soil exploited by plant roots can be greatly increased by the external mycelium of AMF (Bolan, 1991). Borges and Chaney (1988) attributed the varied growth responses in the inoculated Acacia Scleroxyl a seedlings due to inherent difference inefficacy and fungal aggressiveness. Similar responses were recorded in Dalbergia sissoo, D. latifolia and Acacia auriculiformis (Sumana 1993). Considerable yield increase was noticed after inoculation of AMF to field grown maize and leek crops (Furlan, 1993) AMF can be used us a bio fertilizer (Van vuuren *et al, 2010)*

### Conclusion

To get better germination, high seedling vigour and good quality seedling the chip bud may be applied with 2gm VAM fungi, 2gm Azophos and 0.75gm of Psudomonas fluorescens /(per chip bud )and the total quantity may be calculated for planting one acre or ha.

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