Effect of Naphthalene Acetic Acid (NAA) on Root Induction of Macropropagated Pineapple

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ABSTRACT

The study was carried out in the screen house of the University of Port Harcourt. Topsoil and sawdust were evaluated as pineapple nursery media using macro-propagated rooted suckers. The effect of Naphthalene acetic acid (NAA) on root induction was also evaluated on macro-propagated suckers without roots. Results revealed that a mixture of topsoil and sawdust in equal proportions produced more vigorous plants and thus more appropriate for the nursery establishment of pineapple plantlets. Plantlets rooted more in 1mg/1 of Naphthalene acetic acid (NAA) compared to 0mg/1. 3mg/l of NAA gave the lowest number of roots. Evidence from this study showed that sawdust and topsoil in the ratio of 1:1 is the best potting mixture thus, can be used for nursery management of plantlets from crowns of Ananas comosus. Plantlets survival at the nursery stage was 100% irrespective of plant size and number of roots at milking. It is therefore recommended that during sucker multiplication using split crown technique, plantlets should be milked as soon as they emerge to facilitate the sprouting of subsequent suckers.

Keywords: Pineapple, Naphthalene Acetic Acid, Macropropagated, Root Induction

INTRODUCTION

Pineapple (*Ananas comosus* (L.) Merr) is a leading edible member of the family Bromeliaceae. It is cultivated predominantly for its fruits that can be consumed fresh or as canned fruit and juice (Batholomew and Kadzimin,1977). Pineapple rank sixth in the list of fruit producers on commercial scale globally (FAO, 2010) and it is grown in an extensive area in the tropics. It is the only source of bromelain, a proteolytic enzyme that digest protein and it is commonly used in medicine (world health, 2005), the pharmaceutical industry and as a meat tenderizing agent (Fougue, 1981).

Pineapples are vegetative propagated from crowns, or axillary shoots arising from either the base of the fruit (slips) or the base of the plant (suckers). The multiplication rate through natural suckering can only produce one or two sucker per plant per year (Heenkenda, 2003). The mother plants usually produce one or two suckers after harvest between 8-10 months of growth. In recent times, there has been increasing tendency towards large scale (that is, commercial) production of pineapple in the south-southern and southeastern Nigeria by some state governments and private farmers.

The increasing demands for planting materials, gave rise to new methods of propagation which received attention in the 1960's. Such method as *in vitro* propagations which involves the use of lateral or axillary buds from crowns of mature fruits, slips and suckers of pineapples which are cultured in Murashige and Skoog (MS) medium supplemented with high auxin; cytokine ratio. It has been established that the best multiplication medium of pineapple is an MS medium supplemented with 2.5mg/l BAL. 2mg/l NAA and IBA and 10% coconut water. *In vitro* grown plantlets are then successfully rooted in MS medium supplemented with 0.5mg/l NAA and IBA. (Morton, 1987).

Pineapple can also be mass propagated using *in vivo* method (Macro propagation). This involves the selection and making of plants that have home single-crowned, superior fruits without basal slips which are cut close. Therefore, the objective of this study was to evaluate the appropriate potting mixture for nursery management of macro-propagated pineapple plantlets and the effect of Naphthalene acetic acid (NAA) on root induction of macro propagated platelets.

MATERIALS AND METHODS

The study was earned out in the screen house of the Department of Plant Science and Biotechnology in the University of Port Harcourt. Pineapple (cv Smooth Cayenne) suckers were milked from a four Month old multiplication plot located at the residential area of the psychiatric hospital premises. The milked suckers were then transported to the University of Port Harcourt, where they were planted in the screen house of the Department of Plant Science and Biotechnology. Milked suckers were separated on the basis of height and presence and absence of roots. This was carried out by holding the emerging suckers and gently twisting it from the mother plant (crown).

To prepare various concentrations of NAA, whose molecular weight is 186.0 g. 1 mg of NAA was dissolved in small amount of water thereafter the volume was made up to 1000ml. 2mg and 3mg were also dissolved as described above to get 2mg/l and 3mg/l NAA respectively. Plantlets milked with roots were grouped according to their height which range from l-30cm. The various sizes were planted in nursery polybags using 2 different potting mixture. Topsoil (100%) and Topsoil and sawdust (1:1 ratio) were used as potting mixture. The plants were watered dully to avoid desiccation. Plantlets milked without roots were treated with different concentrations of NAA (0, 1.0, 2.0 and 3.0mg/l) to determine the effect of plant regulator on root induction. Suckers were planted using white sand alone and monitored for 8 weeks.

Data were collected on the number of leaves, number of roots and plant height. This was done at 1 week, 4 weeks and 8 weeks after planting. Experimental design used in each evaluation was completely randomized design (CRD) into 2 replications. The analysis of variance (ANOVA) for the assessed traits was carried out based on CRD description.

RESULT AND DISCUSSION

Result obtained indicates that the plantlets were more vigorous in 1:1 top soil and saw dust potting mix than in top soil alone. There were variations in plant height, number of leaf and number of roots at 4 weeks and 8 weeks after planting Figs. 1, 2 and 3).

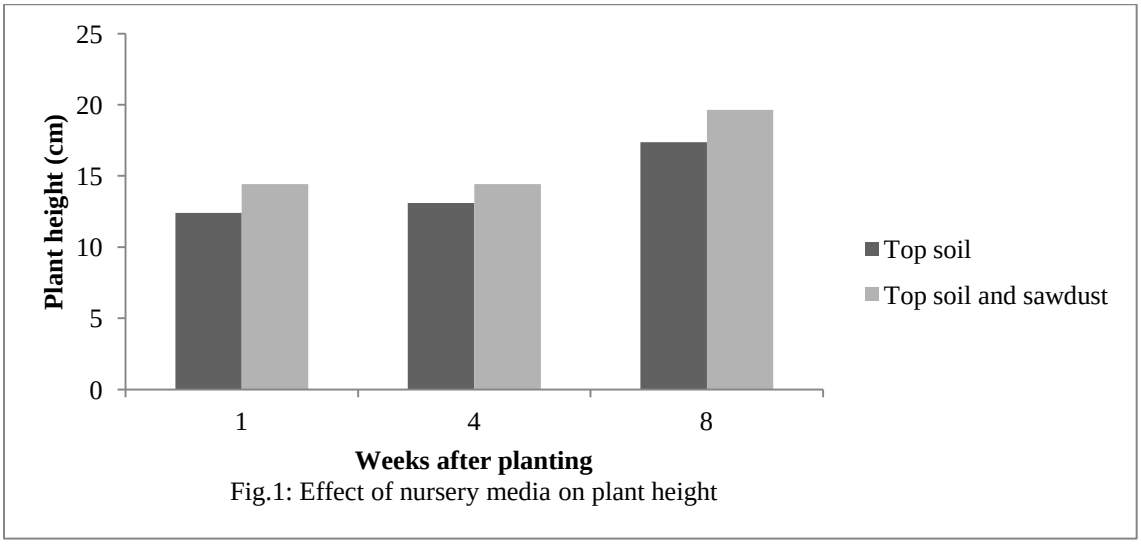

Fig.1: Effect of nursery media on plant height

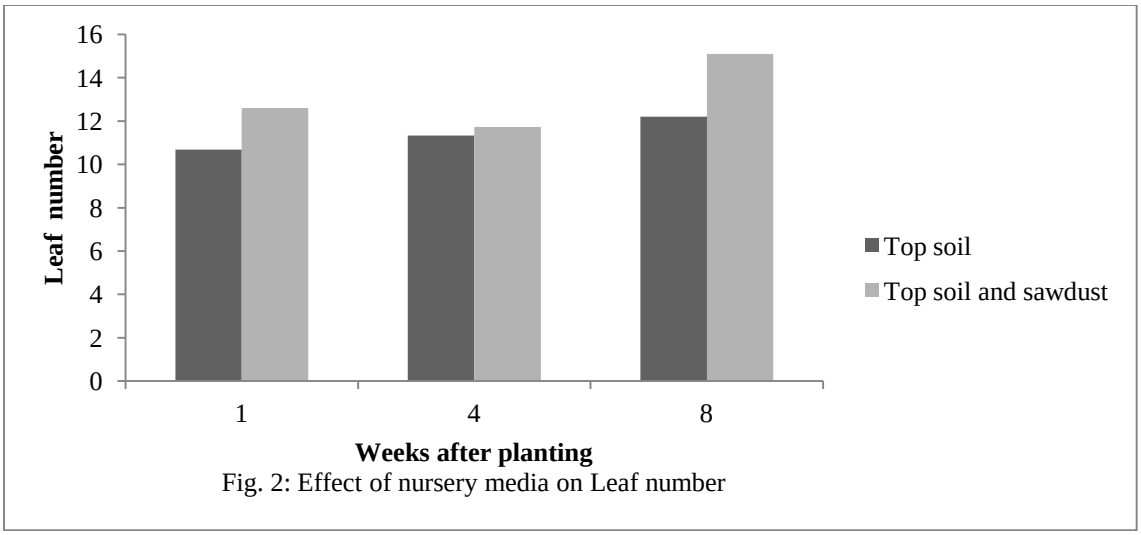

Fig. 2: Effect of nursery media on Leaf number

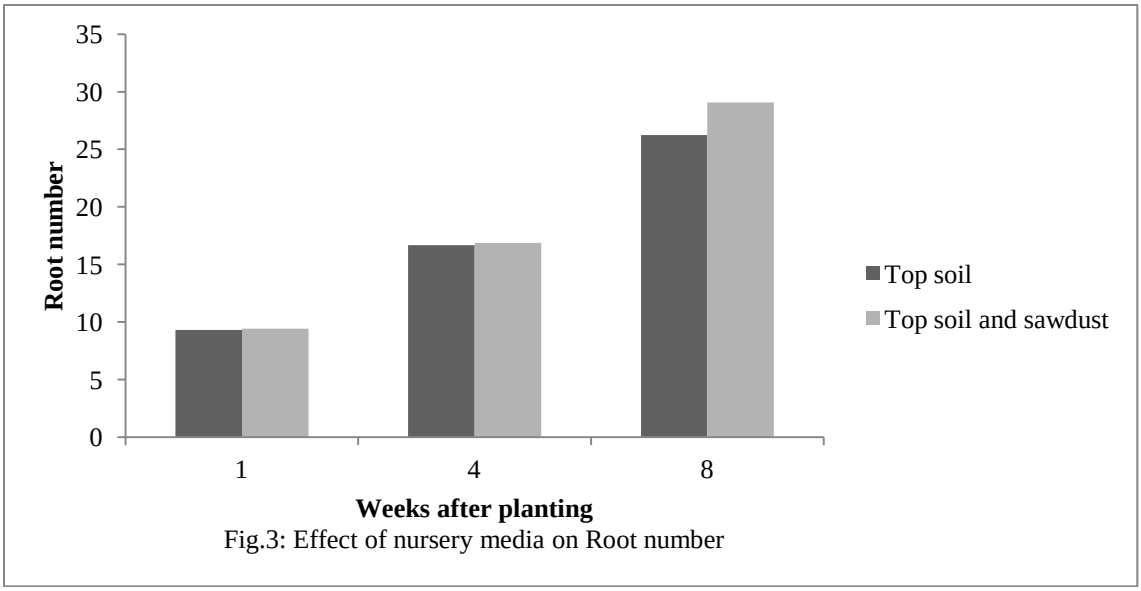

Fig.3: Effect of nursery media on Root number

The results of the nursery media evaluation indicated that topsoil mixed with sawdust in equal proportion (1:1) was a better potting mix than topsoil alone; addition of sawdust may have increased aeration and the organic matter content of the soil as it decays. There was no significant difference between plantlets treated with NAA and control one week after planting. However, 4 weeks after planting, the mean number of roots from plantlets watered with 1mg/1 of NAA was (1.5), 2mg/I (0.67) and 3mg/l (0.33). These values were significantly different from the control which has no roots even after 4 weeks. Plantlets treated with 1 mg/1 NAA gave the highest number of roots than 3 mg/l NAA. and even control. There was no difference on the number of leaves and height of plant from the day of planting and after 8 weeks of this study fig. 4.

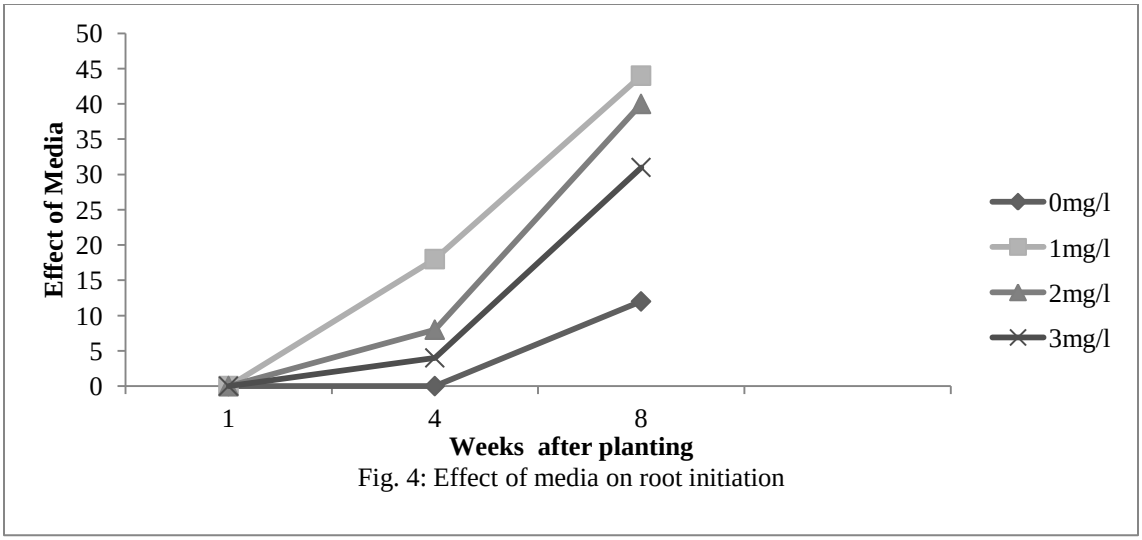

Fig. 4: Effect of media on root initiation

All the plantlets evaluated survived in the nursery, irrespective of the plant size at milking. Plantlets milked without roots also survived and produced roots though root induction was facilitated by the application of NAA. Naturally, suckers developing from axillary buds in crowns of pineapple used for macro-propagation may develop roots and are milked with roots. Occasionally, some suckers are milked before they form roots. Results from the study also indicated that NAA at 1mg/1 can be used to facilitate root induction of such suckers at the nursery stage. NAA has been used effectively to initiate roots in tissue cultured plantlets at various concentrations. Root induction in the nursery can also be achieved by application of NAA but since this is very expensive and not easily available. it Is recommended that farmers or pineapple growers nurse plantlets without NAA until roots are established since the study recorded root formation in plantlets without NAA though at slower rate.

CONCLUSION

This showed that the growth rate of milked macro-propagated pineapple plantlets (cv smooth cayenne) in the nursery is enhanced by using a potting mixture of topsoil and sawdust in the ratio 1:1. This showed that Plant growth regulator like NAA had positive effect on root induction of the plantlets milked without roots. The size (plant height, number of leaves, presence or absence of roots) of milked plantlets does not affect the survival rate in the nursery. On the basis of these conclusion, it could be said that milked plantlets from macro-propagated smooth cayenne pineapples can generally be grown using a potting mixture and I recommend this method of propagating pineapple to all farmers and persons interested in keeping gardens of pineapple with the intension of rapid multiplication of plantlet /suckers for the expansion of a pineapple plantation.

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