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Performance of liquid culture on *in vitro* mass multiplication of woolly aphid (*Ceratovacuna anigera* Zehntner) resistant sugarcane cultivar SNK-44

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ABSTRACT

Meristemculture culture on solid medium was the routine practice in micropropagation of most of the vegetatively propagated crops *in vitro*. Mass multiplication of sugarcane woolly aphid resistant cultivar SNK-44 with the help of meristem culture using liquid culture was the aim of present study. In the current experiment liquid medium was employed in all the stages of micropropagation in combination with different growth regulators for different stages. The meristem from 8 month old mother pant were inoculated on MS medium supplemented with 0.2 mg/l BAP + 0.1mg/l GA3 and 0.1mg/l NAA and 20 g/l sucrose for initiation. Shoots emerged from meristems were subcultured to multiplication medium consisting of MS + 0.2 mg/l BAP + 0.1mg/l NAA and 20 g/l sucrose. The culture bottles were kept with continuous shaking at five differ speeds *viz*., 25, 50, 75, 100 and 125 RPM on orbital shaker to determine the optimum speed for multiplication of large number of shoots in short period. The highest multiplication with an average of 6.45 seedlings per incoula on each cycle of multiplication was found at 100 RPM and lowest was at 25 RPM with 4.06 seedlings. The highest speed of 125 RPM did not increase the rate of multiplication rather it declined with an average of 4.83 seedlings per incoula per cycle. The meristems inoculated on static position responded poorly with an average of 2.29 seedlings per cycle of multiplication. The multiplied shoots were rooted in rooting medium (MS + 0.1 mg/l IBA and 20 g/l sucrose) and seedlings were hardened before discharge for field plantation. The rate of shoot multiplication was found increasing form 25 to 100 RPM but declined at 125 RPM revealing 100 RPM is the most suitable for large scale multiplication of sugarcane cultivars using liquid culture medium on orbital shaker. The cost of production for each seedling was also found less compared to gelled medium. The method was found most successful up to six to seven cycles. It is a novel way for popularizing the newly developed sugarcane cultivars in short time for larger areas.

Key words : Woolly aphid resistant, Sugarcane, Meristems, Multiplication, Seedlings

INTRODUCTION

Sugarcane (*Saccharum officinarum*) is an economical cash crop extensively grown all over the world. It is polysomic, highly heterozygous, clonally propagated crop that accounts for more than 60 per cent of the global sugar production (Guimarces and Sobral, 1998) with an employment opportunity to over more than 100 million people across the world, both in rural and urban industrial sector. The importance of this crop has increased many folds in recent years, since the cane has become an important raw material for sugar industries and allied industries engaged in production of potable alcohol, acetic acid, butanol, paper, plywood, industrial enzymes, animal feed (Arencibia, 1998). Ethanol is commercial product of sugarcane. Blending of petrol, diesel and gasoline with ethanol has added an additional demand for sugarcane production world over. Many of the countries have adopted blending of automobile fuels up to 10% with ethanol to reduce dependence on declining resources of fossil fuels, which also helps in reducing the environmental pollution.

Commercial sugarcane varieties play key role in meeting required demand in the sugar industry. They are obtained through crossing, prolonged breeding and multistage evaluation, which involves selection over a period of years. The cost of complete development of such elite varieties reaches millions of dollars (Birch, 1996) and their multiplication for large area coverage is difficult by conventional method of set multiplication. Tissue culture technology is the best suited procedure for large scale multiplication of vegetative propagated crops such as sugarcane and banana. The technology enables to reduce the time between development and release of a new varieties (Feldmann *et al*., 1994; Taylor and Dukic, 1993). The technology offers best methodology to obtain quality seed material in shorter period of time. Numbers of attempts have been made to standardize large scale micro propagation protocols. Achieving high rate of seedling multiplication is a challenge without affecting the genetic makeup and physical characters of planting material (Williams and Taji, 1991). Lowering the cost of production is another concern in case of commercial production under large scale, which enables to purchase by maximum growers. But, the current situation is still not so satisfactory in production of required quantity of planting material within time at affordable prices. Efforts by many of the workers are still undergoing.

The presently available protocols of *in vitro* propagation of sugarcane allow use of medium semi solidified with agar agar (0.5 to 0.8 %) in all the stages, since from initiation to rooting of the seedlings. Use of liquid medium is often considered as superior for shoot multiplication, it also enables the earlier detection of any

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