Pak. J. Bot., 20(2): 221–225, 1988.

EFFECT OF GA_3 ON SHOOT PROLIFERATION IN DIFFERENT DATE PALM VARIETIES

ATA-UR-REHMAN, HAMID RASHID, AZRA QURESHI AND ISAAC JOHN

Tissue Culture Laboratory,
National Agricultural Research Centre, Islamabad, Pakistan.

Abstract

Shoot tips excised from apical and axillary buds of date palm varieties Dhakki, Khudrawi and Zahidi showed shoot proliferation on MS medium supplemented with GA_3, where complete plantlets were obtained only in cv., Dhakki.

Introduction

Date palm tissue culture investigations at the National Agricultural Research Centre, Islamabad have been focussed on the clonal propagation using both apical and axillary buds from suckers (Rehman *et al.*, 1985). Date palm is dioecious, hence its propagation through seeds does not ensure true to type plants. Conventionally, off shoots or suckers which arise from the base of mother plants are the only source for their clonal propagation. However, mass production of date palm from these off shoots is not possible because of their limited number (Reuveni *et al.*, 1972). Several workers have obtained successful results using different clonal tissues, (axillary, apical and inflorescence buds) seedlings and embryo explants (Ammar & Badeis, 1983; Tisserat, 1984; Khan *et al.*, 1983; Gabr & Tisserat, 1985; Drira & Bembadis, 1985; Quraishi, 1988). In the present study direct shoot regeneration from buds was possible when GA_3 was supplemented in the culture medium.

Materials and Methods

One hundred and fifty off shoots or suckers from 2-3 years old date palm varieties Dhakki, Khudrawi and Zahidi, obtained from Dera Ismail Khan, Pakistan in August, 1985, were transplanted at the National Agricultural Research Centre, Islamabad. The established off shoots were taken as a source of lateral buds and apical buds which furnished the explant for culture.

The suckers were dug out to excise buds, both axillary and terminal, with the help of a sharp knife after removing the fibrous sheath. They were immediately plunged in cold antioxidant solution (citric acid, 150mg and ascorbic acid, 100mg) and kept overnight in a refrigerator. Approximately 0.5-1.5cm pieces were surface sterilized for 35-40 min., in 3% sodium hypochlorite solution containing 0.1% 7x washing detergent followed by 3

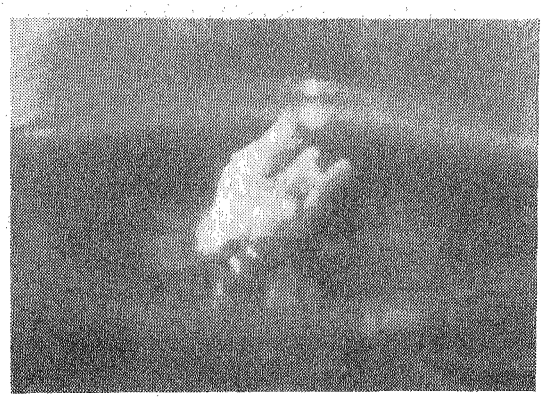

Fig. 1. Apical bud one week after culture on MS medium supplemented with 7.5 mg/l GA_3.

washings in autoclaved distilled water. The explants were grown on modified MS medium containing activated neutralized charcoal, 0.2% sucrose 30g/l and agar 7.5g/1 in 57mm x 120mm glass jars. MS medium was further supplemented with different concentrations of GA_3 (2.5 to 5mg/1) alone, or in combination with 2,4-D (5 to 10mg/l). The cultures were incubated at 26°C ± 2°C, with a photoperiod of 16 h and a light intensity of 3,000 lux. For each variety tested there were 10 replicates.

Results and Discussions

The axillary and terminal buds within six weeks of culture turned green, initiated leaves and enlarged considerably in cv., Dhakki on media containing high concentrations of GA_3 alone (7.5 to 10mg/l) (Fig. 1&2). Cvs. Khudrawi and Zahidi were less responsive

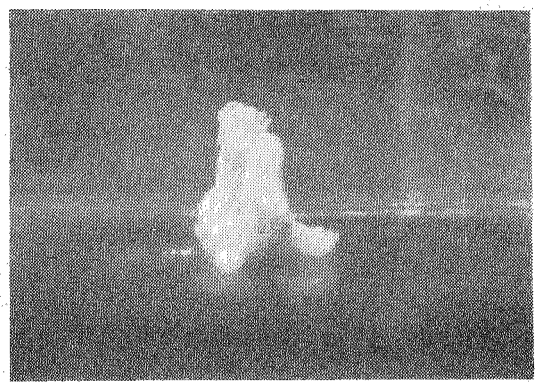

Fig. 2. Apical bud after two weeks of culture on MS medium supplemented with 7.5 mg/l GA_3.

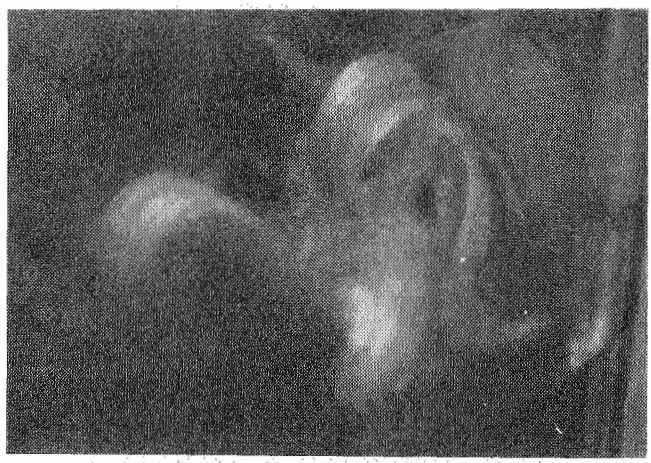

Fig. 3. Shoot formation from apical buds of cv. Dhakki within 6-8 weeks of culture on MS medium containing 1 mg/l NAA.

and showed pronounced tissue growth. After 6 weeks, the explants were subcultured on MS medium supplemented with 10mg/l NAA without activated charcoal. Vigorous shoot growth was noted in Dhakki, but no further improvement was observed in cvs., Khudrawi and Zahidi. Further subculturing of Dhakki on a nutrient medium containng 1mg/l NAA and 10mg/l NAA showed no growth, but abnormality increased with sparse root initiation.

When subcultured on a medium without NAA, the emerging shoots were white in colour with no further growth, but when the culture medium contained NAA in combination with GA_3, the tips turned green and full grown shoots were produced within 4 weeks. Of the several media tested, better results were obtained where NAA 20mg/l and GA_3 5mg/l were used resulting in the production of well developed shoots within six to eight weeks in 30 to 40% of the cultures (Fig. 3). Repeated subculturing on a medium with low dose of GA_3 i.e., 1mg/l initiated root primordia (Fig. 4). The plantlets thus obtained were normal and rsembled date palm seedlings. Presumably GA_3 although inactivated at high temperatures, can still retain its activity in the form of its decomposition products such as Gibberellinic acid, Allogibberic acid which elicit some of the physiological effects of giberellins.

Original browning and contamination was reduced from 60-90% samples by using trimmed explants (Zaid, 1984) before sterilization and 0.1% 7 x per 200ml of 3% bleach solution, respectively. Direct regeneration of shoots from apical and axillary buds using gibberellic acid as an organic addenda has been rarely reported.

Fig. 4. Root formation from the proliferated tissue of the apical buds in cv. Dhakki after six weeks of culture.

References

Ammar, S. and A.A.B. Badeis. 1983. Vegetative propagation of date palm (*Phoenix dactylifera* L.) by *in vitro* culture. In: *Proc. First symposium on the date palm in Saudi Arabia.* Al-Hassa, Saudi Arabia King Faisal University, 158-166.

Gabr, M.F. and B. Tisserat. 1985. Propagation of palms *in vitro* with special emphasis on the date palm (*Phoenix dactylifera* L.).*Scientia Horticulture,* 25: 255-262.

Khan, M.A., M.S. Khalil and M.S. Al-Kahtani. 1983. *In vitro* culture of different tissues of date palm (*Phoenix dactylifera* L.) offshoot. *Proc. 1st Symposium on the date palm in Saudi Arabia.* K.F. Univ., Al-Hassa (Saudi Arabia), pp: 152-157.

Murashige, T. and F. Skoog. 1962. A revised medium for rapid growth and bioassays with tobacco tissue cultures. *Physiol. Plant.,* 15: 473-497.

Qureshi, A., S.U. Ahmed, A. Rehman and N. Mehmood. 1982. A study of callogenesis in *Phoenix dactylifera*, the date palm. *Proc. PBC. 1st Reg. Plant Scientists. Conf.*, Peshawar (Pakistan), pp: 223-229.

Rehman, A., S.U. Ahmed, I. John and A. Qureshi. 1985. Growth responses by different explant tissues in *Phoneix dactylifera*, the date palm. In: *Plant tissue culture*. A. Quraishi and I. John (Eds) Pakistan Agricultural Research Council, Islamabad Pakistan, pp: 73-78.

Reuveni, O., Y. Adato and H. Lilien-Kipinis. 1972. A study of new and rapid methods for the vegetative propagation of date palm. *Report of the Annual Date Grower's Institute*, 49: 17-24.

Tisserat, B. 1984. Propagation of date palms by shoot tip culture. *Hort. Sci.*, 19: 230-231.

Zaid, A. 1984. *In vitro* browning of tissue and media with special emphasis to the date palm cultures. *Date palm* J, 3: 269-275.

(Received for publication 12 August 1987)