Indian J. Genet., **65**(1): 61-62 (2005)

Short Communication

In vitro propagation of jute plant (*Corchorus capsularis* L.) from shoot tip callus

S. Nandy, S. Mitra and M. K. Sinha

Division of Crop Improvement, Central Research Institute for Jute and Allied Fibre, Barrackpore 700 120

(Received: May 2004; Revised: March 2005; Accepted: March 2005)

Crop improvement by generating somaclonal variants [1, 2] is an important tool available to plant breeders. However, till now no report was available about the success of tissue culture in jute. Thus, the present experiment was initiated to study the *in vitro* response of jute and an attempt was made to regenerate plants from shoot tip explants.

Shoot tips of *Corchorus capsularis* variety JRC-212 collected from selected healthy plants grown in the field were used as experimental explants. The explants were initially washed in 10% teepol solution followed by rinsing in running tap water and again immersed in 0.1% Bavistin for 3 minutes. After washings in distilled water 3-5 times the explants were surface sterilized with mercuric chloride solution (0.1%) for 1-2 minutes and washed again with sterile distilled water for 10 times before inoculation onto autoclaved modified Murashige and Skoog (1962) [3] medium containing 75% of each salts including vitamins and 7g/l of agar. 30g/l of table sugar has been used incase of sucrose for low cost *in vitro* plant production. Explants about 2-8 mm size were excised out from the washed organ on Laminar airflow cabinet and cultured onto the solid medium in culture tubes with different concentration of hormones (Cytokinins and Auxins) individually or in combinations. The culture were maintained at 25 ± 2°C under fluorescent light of about 3000 lux for 16 hrs per day.

BAP with NAA and IBA combination induced a large amount of creamy callus, which turned brown and nodular after a week and gave rise to many buds (Fig. 1). Twenty five replicates of shoot tip callus were used and each experiment was repeated three times for different treatments. Observations were made each time at the end of three weeks after incubation without any preconditioning. Growth response of the meristemetic regions on different media compositions were noted and the efficiency of plant growth regulators were assessed by counting the number of multiple shoots or buds at the callus portion of each explants. The highest percentage of shooting response (96%) (Table 1) as well as mean number of shoots (19 shoots/culture) were recorded in BAP (1mg/l)+NAA (0.1 mg/l) (Fig. 2), treatment followed by BAP (0.75 mg/l)+IBA (0.5 mg/l) and BAP (0.75 mg/l)+NAA (0.1 mg/l). When tried with individual cytokinin, the percentage of shoot induction was found to be less than the combination with auxin. Shoots developed on BAP medium showed profuse growth but addition of NAA enhanced the shoot bud induction through callus by repeated sub-culturing in the same medium (Fig. 3).

Individual shoots, which were 2-3 cm long, having at least two leaves were excised from the shoot clump and transferred to the modified MS without hormones and with hormones containing different concentrations of NAA and IBA for rooting (Fig. 4). The rooting of shoots was observed within seven days of culture. Of the two auxins used, IBA along with NAA at 0.5mg/l each induced highest percentage of rooting (90%) with maximum number of roots (21 roots/shoots) followed by modified MS medium without hormone (18 roots/shoots). It is to be suggested that for low cost production of root initiation in modified MS medium without hormone is the best one.

After three weeks of root induction, plantlets were transferred to the polycups filled with sterile soil containing liquid modified MS (Fig. 5) and covered with polythene bags to maintain humidity. The regenerated plants were transferred to green house for further growth. Plant generation was generally influenced by many factors like media composition nature of the explants, genotypes, cultural environments etc. Plantlets were allowed to establish in this environment for one month, which were then suitable for transfer to the field soil (Figs. 6-8).

This efficient and reproducible protocol for regeneration of plantlets from the shoot tip explants of jute (*C. capsularis*) could be utilized for generating large-scale plants to induce somaclonal variation by *in vitro* mutagenesis and development of flood and disease resistant plants through particle bombardment or *Agrobacterium* mediated transformation experiments in the near future.

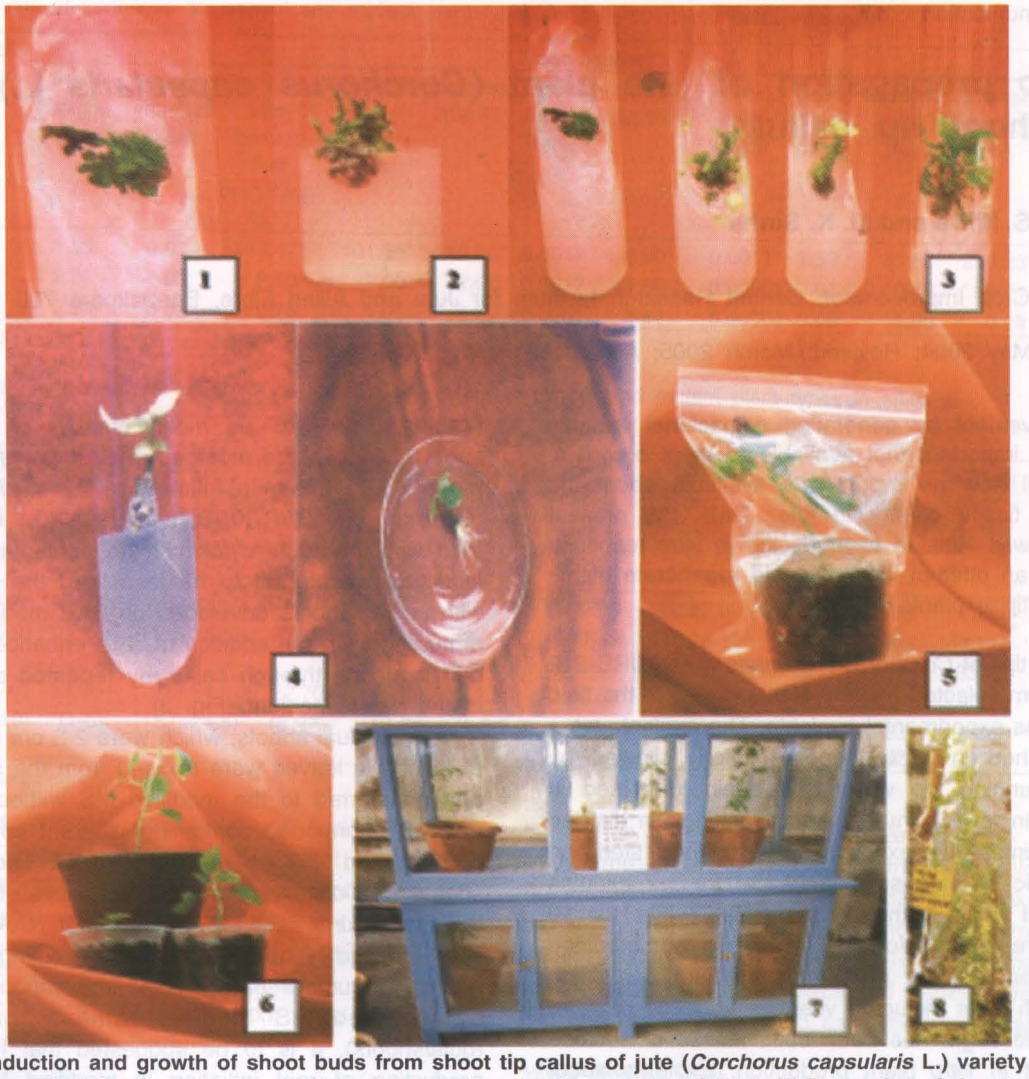

Fig. 1. (1) Induction and growth of shoot buds from shoot tip callus of jute (*Corchorus capsularis* L.) variety JRC-212; (2) Regenerated shoots on modified MS medium with 1 mg/l BAP and 0.1 mg/l NAA; (3) Elongation of shoots after repeated subculturing in the same medium; (4) Individual shoots (2-3 cm long) excised for rooting; (5) Transfer of jute plants from MS medium to soilrite with Polythene bag; (6) Jute plants without polythene bag in hardening process; (7) *In vitro* jute plants in pots established in green house; and (8) at field.

Table 1. Effect of growth regulators on microshoot induction and multiplication from shoot tip callus of jute in modified MS medium with sugar 30g/l

MS with growth regulator	mg/l	Mean number of shoots per explants (Percentage of response)						
		I BA				NAA		
		0	0.1	0.5	1	0.1	0.5	1
BAP	0	NIL	NIL	NIL	NIL	NIL	NIL	NIL
	0.5	2.0 (40)	7.0 (44)	9.5 (48)	4.0 (36)	9.5 (56)	8.2 (56)	3.0 (36)
	0.75	8.0 (80)	12.8 (92)	15.0 (96)	9.0 (72)	13.3 (84)	11.0 (80)	7.0 (64)
	1	8.6 (76)	10.0 (76)	9.8 (80)	11.0 (56)	19.0 (96)	9.0 (76)	7.5 (76)
	1.5	7.0 (84)	9.0 (76)	4.0 (52)	3.0 (32)	6.5 (60)	3.0 (76)	4.0 (24)
	2	6.0 (48)	3.0 (28)	2.0 (36)	2.0 (28)	4.5 (48)	4.0 (40)	1.6 (16)

(*Number of explants cultured for each treatment = 25); Kin = Kinetin, BAP = 6-Benzyl-aminopurine, IBA = Indole-3-butyric acid, NAA = 1-Napthaleneacetic acid, MS = Murashige and Skoog medium

Reference

1. **Scowcroft W. R. and Larkin P. J.** 1982. Somaclonal variation; A new option for plant improvement. *In*: Vasil I.K., Scowcroft W.R. and Frey K. J. (Eds). Plant improvement and somatic cell genetics. Academic press, New York, pp. 158-178.
2. **Evan D. A., Sharp W. R. and Bravo J. E.** 1984. Cell culture methods for crop improvement. *In*: Handbook of plant cell culture, Sharp W.R., Evan D.A., Ammirato P.V. and Yamada Y. (eds) Vol. **2**: 47-68.
3. **Murashige T. and Skoog F.** 1962. A revised medium for rapid growth and bioassays with tobacco tissue cultures, Physiol. Plant., **15**: 473-497.