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A S Chandel and R M Kamal

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FIBRE CROPS

Cotton

699 ANITHA, K; SAJINI, KK. 1994. **In vitro active conservation of coconut zygotic embryos.** *International symposium on Plantation Crops*. (NRC, Calicut: 1994: November 31-December 2).

700 ARATI, AK; BALASUBRAMANYS, RH; KHANDEPARKAR, VG. 1994. **Cotton stalk spawn of *Pleurotus sajor-caju* on the yields of mushrooms** *National Symposium*. Mushroom Research and Training, Solan, H.P. p. 8-10.

701 BAJAJ, YPS; GILL, MS. 1989. **Pollen-embryogenesis and chromosomal variation in anther culture of a diploid cotton (*Gossypium arboreum L.*).** *Sabrao Journal*, 21: 1, 57-63; 13 ref.

When excised anthers were cultured on various media, the highest callus induction of 44.5% was obtained using MS medium containing 2 mg NAA and 1 mg benzylaminopurine [benzyladenine] (BAP)/litre. Cold pretreatment at 4°C in the dark for 48 h reduced the amount of callus growth in all culture media although it induced multinucleate pollen production and embryogenesis. Cytological examination of callus revealed that the chromosome number varied from haploid (n = 13) to hexaploid and aneuploid.

702 BALASUBRAMANYA, RH; PARALIKAR, KM; PATIL, NB; SUNDARAM, V. 1990. **A compendium on fibre bases of cotton lint from different species of *Gossypium*.** *Indian Soc. Cotton Imp. J.* 15 : 119-122.

703 BALASUBRAMANYA, RH; BHATAWDEKAR, SP; PARALIKAR, KM. 1985. **A new method for reducing the stickiness of cotton.** *Text. Rese. J.* 55 : 227-232.

704 BALASUBRAMANYA, RH; BETRABET, SM. 1982. **Biological control of two soil-borne fungal phylopathogens of cotton by amending the boil with prawn-shell waste.** *Agri. Wastes*, 4: 163-171.

705 BALASUBRAMANYA, RH; PAI, YD; SHAIKH, AJ; KHANDEPARKAR, VG. 1989. **Biological softening of spent cotton plant stalks for the preparation of pulp.** *Biol. Wastes,*, 30: 317-320.

706 BALASUBRAMANYA, RH; PARALIKAR, KM; PATIL, NB; SUNDARAM, V. 1987. **Sturcture of seed coat (external and internal) and colyledon surface of all the four cultivated species of cotton as revealed by scannsing electron microscope.** *Indian Soc. Cotton Imp. J.* 12: 19-32.

707 BALASUBRAMANYS, RH; PARALIKAR, KM; CHIDAMBARESWARAN, PK; PATIL, NB; SUNDARAM, V. 1992. **A note on the new wilt of cotton.** *Indian soc. Cotton Imp. J.* 17: 74-78.

708 BALASUBRAMANYS, RH; PARALIKAR, KM; PATIL, NB; SUNDARAM, V. 1987. **Observation of fibre base of cotton unt by scanning electron microscopy.** *Soc. Cotton Imp. J.* 12: 135-137.

709 BETRABET, SM; BALASUBRAMANYA, RH. 1979. **Isolation of chitinoclastic microorganisms and their application with chitin in the biological control of verticillum wilt of cotton.** *J. Indian Soc. Cotton Imp.* 4: 85-90.

710 BHATAWDERAR, SP; BALASUBRAMANYA, RH; KHANDEPARKAR, VG; SINGH, VV; NARAYANAN, SS. 1994. **Characterization of cottonseed proteins in selected germplasm of diploid cottons.** *Indian Soc. Cotton Imp. J.*

711 CHIDAMBARESWARAN PK; BALASUBRAMANUYA, RH; BHATAWDEKAR, SP; SREENIVASAN, S; SUNDARAM, V. 1986. **Enchanced enzymolysis of cotton fibres and cotton Plant stalks.** *Enz. Mocrobial Technol.* 9: 561-567.

712 EKBOTE, MV; MALI, JB. 1984. **Insect injury induced cotton boll-rot in western Maharashtra.** *J. of Maharashtra Agricultural Universities*, 9: 3, 349; 3 ref.

Of 17 varieties of *Gossypium hirsutum*, 3 varieties of *G. barbadense*, 3 *G. hirsutum* hybrids and 2 *G. hirsutum* X *G. barbadense* hybrids screened, the *G. hirsutum* variety KOP368 had the lowest mean percentage incidence of fungal boll rot (13.3%). Amongst hybrids, boll rot incidence was higher in *G. hirsutum* hybrids than in *G. hirsutum* X *G. barbadense* hybrids. In all varieties, the majority of cases of boll rot were associated with previous injury by *Earias* and *Heliothis spp.*

713 KHADI, BM; ARIPDJANOV, SHA. 1990. **A study on nucleic acids and protein in seeds and two days old plants of cotton.** *J. Ind. Soc. Cot. Improv.* 15: 2, 128-130.

714 KHADI, BM; ARIPDJANOV, SHA. 1994. **Comparative study of nuclear, chloroplast and mitochondrial DNA in callus, stem and leaves of cotton**. *J. Cotton Res. and Dev.* 8: 2.

715 KHADI, BM; ARIPDJANOV, SHA. 1990. **Content of nucleic acids and protein in callus, cell suspension culture and plant in cotton**. *Interantional Congress on Plants Tissue and Cell Culture*. (Amsterdam, The Netherlands: 1990: June 24-28).

716 KHADI, BM; KATAGERI, IS. 1994. **In vitro production of cotton fibre**. *All India Symposium on Cotton Production and Utilization*. (Circot, Bombay: 1994: Dec. 2-3).

717 KHADI, BM; KATAGERI, IS; VAMADEVAIAH, HM. 1995. **Micropropagation in cotton**. *Nat. Seminar on Role of Plant Physiology on Crop improvement and production*. Univ. of Manipur, Imphal.

718 KHADI, BM; VESMANOVA, OV. 1991. **Need for generalized procedure for regeneration of plants from callus in cotton**. *International Golden Jubilee Symposium of Indian Soc. of Genet. and Plant*. (New Delhi: 1991: 12-15 Feb), p. 884.

719 KHADI, BM; ARIPDJANOV, SHA; VESMANOVA, OV; USANOV, M. 1990. **Problems in in vitro embryogenesis in gossypium**. *International Symposium on Embryology and Seed Reproduction*. (Leningrad: 1990: July 3-7), p. 74.

720 KHADI, BM; ERGASHEV, AKE. 1991. **Some aspects of in vitro culture of cotton a review**. *J. Ind. Soc. Cot. Improv.* 16: 1, 1-11.

721 KHADI, BM. 1990. **Studies on problems in regeneration of plants from callus and cell suspension culture in cotton**. *AICCIP Biennial Workshop*. (Dharwad: 12th: 1990: Jan 4-6).

722 KHADI, BM; ARIPDJANOV, SHA. 1994. **Study on nucleic acids and protein in undifferentiated and differentiated tissues in cotton**. *J. Cotton Res. and Dev.* 8: 1.

723 KISHOR, PBK; RAO, JD; REDDY, GM. 1992. **Activity of wall-bound enzymes in callus cultures of *Gossypium hirsutum L.* during growth**. *Annals of Botany*, 69: 2, 145-149; 36 ref.

Activities of alpha- and beta-glucosidase, alpha- and beta-galactosidase, alpha-mannosidase, beta-1,3-glucanase, and acid and neutral invertases were detected in the cytoplasmic fraction as well as in cell walls isolated from callus cultures of cotton cv. Sankar-5. Activity of beta-mannosidase, however, could not be detected in the cell walls. Transfer of callus to fresh medium did not immediately influence the activities of alpha-glucosidase and beta- galactosidase but significantly increased beta-glucosidase, alpha-mannosidase, and acid and neutral invertases. Addition of cycloheximide (1 and 100 mg/litre) further stimulated acid and neutral invertases but not the other enzymes tested. NaCl was effective in extracting alpha-glucosidase, beta-glucosidase, beta-galactosidase, and acid and neutral invertases. EDTA extracted most of the alpha-galactosidase, alpha-mannosidase, beta-1,3- glucanase and some alpha-glucosidase. However, NaCl and EDTA could not extract some of the alpha- and beta-glucosidases and also acid and neutral invertases as evidenced from the residual and extracellular activity. Studies with whole cells as a source of enzyme revealed that some of these enzymes were associated with the cell surface.

724 KISHOR, PBK; SATYANARAYANA, P. 1985. **Effect of growth regulators on growth and phenolic production in cotton callus cultures**. *Indian Botanical Reporter*, 4: 2, 111-114; 16 ref.

Cotton callus tissues derived from anther walls were established on Murashige and Skoog medium and given growth regulators for phenol production. The tissue growth was better with auxins at low than at high concn. The synthesis of phenols was significantly increased with IAA and 2,4-D but not with NAA. 2 mg/l was superior to 0.04 mg kinetin/l for tissue growth, but it markedly decreased phenol production. 25 mg GA/l was more effective for tissue growth than 100 mg/l but it did not increase synthesis of phenol. Accumulation of phenols was restricted to the most rapid phase of the growth cycle.

725 KISHOR, PBK; MEHTA, AR. 1988. **Growth and metabolism in cotton and tobacco callus cultures**. *Proceedings of the Indian Academy of Sciences, Plant Sciences*, 98: 4, 277-282; 27 ref.

Activities of key enzymes of glycolytic and pentose phosphate pathways and Krebs cycle were less in tobacco callus than in cotton callus cultures grown under identical condition. The initial period of growth in calluses of both crops was characterized by high activi-

ties of invertase, acid phosphatase, hexokinase, fructose diphosphate aldolase, malate dehydrogenases, succinate dehydrogenase, glucose-6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase; the activities of these enzymes declined during the remaining period of growth.

726 PATEL, RT; DESAI, BB; ADSULE, RN; DAFTARDAR, SY. 1983. **UDP-glucose:glucan synthetase activity in developing fibres of two species of cotton**. *Mysore Journal of Agricultural Sciences*, 17: 2, 124-128; 13 ref.

UDP-glucose:glucan synthetase in the particulate fraction of growing fibres of *Gossypium barbadense cv. Suvin* and *G. hirsutum cv. Laxmi* showed 2 peaks of max. activity at 15 and 40 days post anthesis, possibly corresponding to the 2 phases of cellulose biosynthesis in cotton (primary and secondary wall cellulose synthesis). The cellulose content of cotton fibres in both cv. increased continually throughout the growth period, the most rapid increase being between 10 and 40 days. Water soluble sugars (WSS) decreased abruptly up to 30 days post-anthesis and then steadily thereafter. Cultivar Laxmi had significantly higher enzyme activity and higher cellulose content than cv. Suvin, though cv. Suvin had a higher content of WSS throughout the growth phase.

727 SHAILA P BHATAWDEKAR; SREENIVASAN, S; NALASUBRAMANYA, RH; SUNDARAM, V. 1992. **Enhanced enzymolysis of never-dried cotton fibres belonging to different species**. *J. Appl. Poly. Soc.* 44: 243-248.

728 SINGH, VV; NARAYANA, SS; BHATAWDEKAR, SP; BALASUBRAMANYA, RH; KHANDEPARKAR, VG. 1994. **Amino acid profile in the tetraploid cotton from the germplasm collection**. *Indian J. Agric. Sci.*

729 WEERAKOON, K; FERNANDO, SC; VIDHANAARACHCHI, VRM. 1984. **Culture of Vegetative tissues of coconut in vitro**. CRI, Sri Lanka.

Hybridization

730 BAJAJ, YPS; GILL, MS. 1985. **In vitro induction of genetic variability in cotton *(Gossypium spp.)***. *Theoretical and Applied Genetics*, 70: 4, 363-368

Excised embryos and ovules from hybrids of *G. arboreum* with *G. stocksii*, *G. anomalum* and *G. hirsutum* were cultured on a Murashige & Skoog medium supplemented with IAA, kinetin and casein hydrolysate. The resulting plants matured in the field but growth and survival in the field varied in different crosses. The hybrids involving *G. anomalum* and *G. stocksii* were perennial. The *G. arboreum* X *G. anomalum* hybrid was very vigorous and flowered throughout the year. Chromosome number in calluses from hybrid embryos and ovules and from anthers and hypocotyls of *G. arboreum* and *G. herbaceum* varied from haploid (x = 13) to highly polyploid (2n > 104). Callus from a triploid hybrid embryo (3n = 39) of *G. arboreum* X *G. hirsutum* showed wide diversity in chromosome number, from 2n = 25 to 2n = 45.

731 BRAR, SS; SANDHU, BS. 1984. **In vitro ovule and embryo culture of *Gossypium***. *Current Science*, 53: 21, 1164-1166; 6 ref.

Self and cross pollinated ovules (2 and 15 days old) and embryos of *G. arboreum cv. G27*, *G. herbaceum cv. SM132, G27 X SM132* and G27 X *G. anomalum* (a wild diploid) were cultured on various media. The 2-day-old ovules gave good callus growth on B5 medium supplemented with 2,4-D, and 15-day-old ovules produced vigorous seedlings on Murashige & Skoog (MS) medium supplemented with casein hydrolysate. The 15-day-old embryos of G27, SM132 and their interspecific hybrid developed seedlings on MS medium supplemented with IAA (2 mg/litre) and kinetin (0.5 mg/litre), which was the best medium for embryo culture. Plantlet formation from embryos was 82.9% in G27, 74.3% in SM132 and 72.9 in G27 X SM132.

732 CHARYULU, NR; RAO, PA. 1984. **Combining ability analysis for seed cotton yield in interspecific cotton hybrids**. *Indian Journal of Genetics and Plant Breeding*, 44: 3, 469-471; 5 ref.

In a line X tester analysis of 32 hybrids between 4 varieties of *Gossypium hirsutum* as female parents and 8 of *G. barbadense*, Gujarat 67 X Suvin showed the highest positive specific combining ability.

733 CHARYULU, NR; RAO, PA; ARUNACHALAM, V. 1984. **Genetic studies on mote index, pollen sterility and earliness in interspecific cotton hybrids**. *Coton et Fibres Tropicales*, 39: 2, 35-38; 11 ref.

Thirty-two crosses were studied which derived from crossing four varieties of *Gossypium hirsutum* with eight of *G. barbadense*. In the F1, the mote index and pollen sterility were controlled predominantly by additive effects; for earliness, general combining ability (GCA) estimates were lower than specific combining ability

(SCA) effects. High mean values for all the characters and good GCA effects were observed in the *G. hirsutum* varieties American Nectariless and K3400 and in the varieties SB289E and SB1095-6 of *G. barbadense*. Only the crosses American Nectariless X SB289E and American Nectariless X SB1095-6 had high SCA values for all characters.

734 DESHPANDE, LA; KOKATE, RM; KULKARNI, UG; NERKAR, YS. 1991. **Cytomorphological studies in induced tetraploid *G. arboreum* and its interspecific hybrid with tetraploid *G. hirsutum L.*** *Indian Journal of Genetics and Plant Breeding*, 51: 2, 194-202.

735 GENNUR, MN; HABIB, AF; KADAPA, SN; GOUD, JV. 1986. **Cytogenetic studies in interspecific and intraspecific hybrids of *Gossypium herbaceum L.* and *Gossypium arboreum L.*** *Caryologia*, 39: 1, 65-68; 7 ref.

Meiotic chromosome pairing studies of hybrids among 2 genotypes of each species revealed that *G. herbaceum* and *G. arboreum* are differentiated cytologically by a single chromosome translocation. Pollen sterility ranged from 2.3 to 4.6% in intraspecific hybrids and from 11.3 to 29.6% in interspecific hybrids.

736 GILL, MS; BAJAJ, YPS. 1986. **In vitro production of interspecific hybrids in *Gossypium* and their utilization in backcrossing**. *Zeitschrift fur Pflanzenzuchtung*, 96: 2, 174-176; 13 ref.

Hybrid plants were obtained through in vitro culture of embryos from *G. arboreum* X *G. anomalum*, *G. arboreum* X *G. stocksii* and *G. herbaceum* X *G. stocksii*, but on transfer to the field the hybrids set no seed. Seeds were formed after backcrossing *G. arboreum* X *G. anomalum* to *G. arboreum*. The backcross progeny showed variation for size and shape of leaves and bracts, flower colour and self sterility or fertility.

737 GILL, MS; BAJAJ, YPS. 1984. **In vitro production of interspecific hybrids in cotton**. *Current Science*, 53: 2, 102-104; 5 ref.

Excised embryos from various crosses developed best on Murashige and Skoog medium supplemented with 1.5 mg/l IAA + 0.5 mg/l kinetin + 250 mg/l casein hydrolysate. Germination and number of plantlets obtained ranged from 48% for *Gossypium herbaceum* X *G. stocksii* to 71% for *G. arboreum* X *G. stocksii*. Germination occurred within 25-30 days of culturing after an initial period in the dark. Of the hybrid ovules cultured, those from diploid X diploid crosses (*G. arboreum* X *G. anomalum*) grew best on medium containing 0.5 mg/l kinetin and germinated in 45-55 days of culturing, while those from tetraploid X diploid crosses (*G. hirsutum* X *G. arboreum*) grew best on medium containing 0.2 mg/l kinetin and germinated in 60-65 days. Hybrid plants were mostly intermediate between their parents for morphological traits. *G. arboreum* X *G. anomalum* hybrids were vigorous, had large leaves and produced large flowers.

738 GILL, MS; BAJAJ, YPS. 1984. **Interspecific hybridization in the genus *Gossypium* through embryo culture**. *Euphytica*, 33: 2, 305-311; 10 ref.

Field-grown plants of 4 species were crossed and boll retention was enhanced by spraying daily with a mixture of 50 mg GA/litre and 100 mg NAA/litre. Embryos of *G. arboreum* X *G. stocksii*, *G. arboreum* X *G. anomalum* and *G. herbaceum* X *G. stocksii* were transferred to culture, 15 days after pollination. The resulting plants were vigorous when the cultures were incubated in the dark for 15-25 days before being exposed to light. Embryos of *G. arboreum* X *G. anomalum* grew the most rapidly but more embryos of *G. arboreum* X *G. stocksii* produced seedlings. In general, the characters of the hybrids, subsequently grown in the field, were intermediate between those of the parents. *G. arboreum* X *G. anomalum* hybrids were almost twice as tall as either parent and bore more flowers. All the hybrids were perennial, remaining green in the winter. Those of *G. arboreum* X *G. anomalum* flowered throughout the year.

739 HOLLA, U; KADAPA, SN; GOUD, JV. 1984. **Heterosis in *Gossypium herbaceum* X *G. arboreum***. *Indian Journal of Agricultural Sciences*, 54: 1, 16-24; 8 ref.

Fourteen yield-related characters were investigated using a line X tester analysis involving 6 *G. herbaceum* genotypes (female) and 4 of *G. arboreum* (male). Heterosis over the midparental value was 222% for raw cotton yield, mostly owing to heterosis for bolls/plant. Crosses involving the *G. herbaceum* line G27 showed high heterosis for seed-cotton yield. Heterosis was moderate to high for the remaining characters except boll weight. SM88 X G27 produced a 62.4% higher yield and 8.5% greater ginning outturn than the standard commercial variety Jayadhar.

740 KAPSE, SS; NERKAR, YS. 1985. **Polyacrylamide gel electrophoresis of soluble seed proteins in relation to cultivar identification in cotton**. *Seed Science and Technology*, 13: 3, 847-852; 10 ref.

Electrophoregrams of the soluble proteins of single seeds of 4 *Gossypium hirsutum* hybrids, 2 *G. hirsutum* X *G. barbadense* interspecific hybrids and their parents, and 2 varieties each of *G. hirsutum* and *G. arboreum* were compared. The entries could be distinguished by their electrophoregrams and it is concluded that the technique could serve as a supplement to field tests in determining the purity of cotton cultivars. In general, the banding patterns of the hybrids were closer to those of their male than to those of their female parents.

741 KATAGERI, IS; KADAPA, SN; KHADI, BM; ESHANNA, MR; NAIK, RB. 1992. **Hybrid vigour and inbreeding depression in the inter-racial crosses of *Gossypium hirsutum L.*** *Karnataka Journal of Agricultural Sciences*, 5: 1, 1-3.

742 KHAJJIDONI, ST; HIREMATH, KG; GOUD, JV; KADAPA, SN. 1985. **Gene action for ten quantitative characters in diploid cotton (*G. herbaceum L.* and *G. arboreum L.*).** *Mysore Journal of Agricultural Sciences*, 19: 3, 159-161; 10 ref.

Epistasis was detected for seed index and lint index in crosses of 10 varieties of *Gossypium herbaceum*, as male parents, with 2 of *G. arboreum*. Additive variance was important for days to 50% boll opening, yield of seed cotton, number of bolls/plant and seed index. The dominance component was significant for node number, lint index and ginning outturn.

743 KHAJJIDONI, ST; HIREMATH, KG; KADAPA, SN; GOUD, JV. 1984. **Heterosis and combining ability in *Gossypium herbaceum* and *G. arboreum*.** *Indian J. of Agricultural Sciences*, 54: 1, 9-16; 4 ref.

Two *G. arboreum* lines (female) were crossed with 10 *G. herbaceum* varieties (male) in a line X tester analysis and 10 yield-related characters were investigated. General combining ability (GCA) variances were higher than specific combining ability (SCA) variances for bolls/plant, boll weight, seeds/boll and halo length, indicating the importance of additive gene effects. SCA variances were higher than GCA variances for nodes/plant, days to 50% boll opening, seed cotton yield, seed index and lint index. Heterosis was observed in most crosses for all characters except seeds/boll. G27 X SM73 and G27 X Jayadhar proved commercially exploitable.

744 KOLGANOVA, TV; SRIVASTAVA, DK; METT, VL; PIRUZIAN, ES. 1989. **Genetic transformation of cotton**. *National Conference on Genetics of Somatic Cells in Culture*. Moscow, USSR.

745 KOLTE, TB; THOMBRE, MV. 1984. **Heterosis and combining ability studies in *Gossypium species*.** *Journal of Maharashtra Agricultural Universities*, 9: 3, 252-254; 14 ref.

Tabulated data are presented on heterosis and combining ability for 12 yield and fibre characters in an 8 X 8 diallel set, excluding reciprocals, involving 4 varieties of *G. hirsutum* and 4 of *G. barbadense*. Studies on heterosis indicated that the *G. barbadense* X *G. barbadense* hybrid Andrews X Sujata and the *G. barbadense* X *G. hirsutum* hybrids Sujata X American Nectariless and N28 X American Nectariless were most promising for number of sympodia, bolls/plant and seed cotton yield/plant, respectively. The *G. hirsutum* X *G. hirsutum* hybrids B1007 X American Nectariless and B1007 X PRS72 showed significant specific combining ability effects for seed cotton yield. Additive genetic variance was predominant for all 12 characters.

746 MEHETRE, SS; THOMBRE, MV. 1983. **Interspecific hybridization in *Gossypium L.* IV. Cytological studies in the F1 hybrid**. *Journal of Maharashtra Agricultural Universities*, 8: 2, 144-146; 8 ref.

An F1 hybrid was obtained by crossing the petaloid, male-sterile *G. arboreum* variety A247 with *G. anomalum*. The mean chromosome associations observed at metaphase I in the hybrid were 1.22IV + 9.96II + 1.20I. Various chromosome abnormalities were observed during meiosis, including unequal separation of chromosomes, laggards and bridges. Pollen sterility in the hybrid was 42%. Anther development at anthesis was normal.

747 MEHETRE, SS; THOMBRE, MV. 1982. **Microsporogenesis in interspecific F2 haploids of *Gossypium spp.*** *Phytomorphology*, 32: 2/3, 121-125; 22 ref.

Three haploid (2n = 26) F2 plants from the cross *G. hirsutum cv. Laxmi* (2n = 52) X *G. barbadense cv. SB289E* (2n = 52) were studied. Four to 8 bivalents were observed during meiosis. The high frequency of bivalents is explained on the basis of similarities between the A1A2 and D1D2 genomes contributed by *G. hirsutum* and *G. barbadense*, respectively. The possibility of gene-controlled pairing is also indicated. Pollen fertility in the 3 plants was low (1.8-3.2%) due to various meiotic abnormalities such as tripolar spindles, lagging chromosomes and unequal chromosome separation.

748 MESHRAM, LD; TAYYAB, MA. 1990. **Morphological behaviour of synthetic allopolyploids of *Gossypium*.** *Biovigyanam*, 16: 2, 80-82; 9 ref.

Sterile hybrids were produced by crossing *G. anomalum*

X *G. thurberi* (genome 2(B1D1)), *G. davidsonii* X *G. anomalum* (2(D3-dB1)) and *G. hirsutum* X *G. anomalum* (2(AD)1B1). Stem buds treated with 0.2% colchicine produced shoots which were fertile. The *G. anomalum* X *G. thurberi* and *G. davidsonii* X *G. anomalum* plants were allotetraploids while the other was hexaploid. The morphology and fertility of these allopolyploids showed that their vegetative characteristics were similar to one of the parents while the floral characteristics were intermediate. Average number of anthers/flower was very low in *G. anomalum* X *G. thurberi* compared with the others, while 100-seed weight was higher and pollen sterility lower in *G. hirsutum* X *G. anomalum* than in the others. Seeds of *G. anomalum* X *G. thurberi* were without lint.

749 MIRZA, MA; SHAIKH, AL. 1984. **In-ovulo embryo culture of some incompatible species hybrids of *Gossypium***. *Pak. Cottons*, 28: 2, 117-126; 13 ref.

Embryos, in most cases germinated, were obtained following culture of ovules from 8 diploid X diploid and 11 tetraploid crosses on modified BT [Beasley & Ting] medium. Hybrids with tetraploid cytoplasm showed better embryo development than did diploid X diploid hybrids. Seedlings were obtained from 10 crosses and mature plants from the crosses *G. hirsutum* X *G. herbaceum*, *G. hirsutum* X *G. arboreum* and *G. hirsutum* X *G. stocksii*.

750 NARAYANAN, SS; SINGH, JAGMAIL; VARMA, PK. 1984. **Introgressive gene transfer in *Gossypium*, Goals, problems, strategies and achievements**. *Coton et Fibres Tropic.*, 39:4, 123-135; 199 ref.

Interspecific hybridization is reviewed. The strategies discussed to overcome the major problem of genome differentiation include different hybridization techniques, induced or spontaneous polyploidy, backcross breeding, transgressive segregation, trispecific crosses, cytoplasmic male sterility, induced mutation and tissue culture (including embryo and ovule culture, and protoplast fusion).

751 PETER, SD; KRISHNASWAMI, R. 1983. **Genomic-cytoplasmic interaction determining variation in heterosis for yield of cotton hybrids**. *Scientific meeting on genetics and improvement of heterotic: Precongress systems*. (Coimbatore, India: 1983). School of Genetics, Tamil Nadu Agricultural Univ., India. p. 19-20.

Two geographically isolated cultivars from each of *Gossypium hirsutum* and *G. barbadense* were studied. High-yielding hybrids with high heterotic value for yield were obtained from crosses involving long X long sympodial and long X short sympodial types. A cytoplasm X genome interaction determining the heterosis for seed cotton yield and boll number was observed. A gene X cytoplasm regulatory system operating in tetraploid species may be responsible for the differences in cytoplasm X genome interaction in the different crosses.

752 SANDHU, BS; SINGH, TH. 1984. **Genomic constitution and the origin of cottons - a review**. *Crop Improvement*, 11: 1, 1-9; 66 ref.

The following topics are reviewed: (1) genomic relationships amongst species and interspecific hybrids of *Gossypium*; (2) genome designations; (3) constitution of diploid species; (4) centres of origin of diploids and tetraploids; (5) diploidization of allotetraploids; (6) aneuploidy, and its use in gene location and in substitution lines; and (7) haploidy.

753 SHUAIB, MOHAMMAD; SIDDIQUI, KHUSHNOOD A; SALAHUDDIN, MOHAMMAD; HODA, SHAMSUL. 1981. **Improvement of cotton through induced mutations and interspecific hybridization**. *Nucleus, Pakistan*, 18: 4, 37-42; 7 ref.

A survey is presented of work in Pakistan on (1) induced mutation, commenced in 1964, with respect to improved fibre quality, yield and resistance to insect pests, including *Pectinophora* and *Earias spp.*, and (2) hybridization between *Gossypium hirsutum* and *G. barbadense*.

754 SINGH, TH; CHAHAL, GS; VITHAL, VM; NAGI, PS; RANDHAWA, LS. 1991. **Extent of natural crossing in cotton in Punjab**. *Crop Improvement*, 18: 1, 54-57.

755 THENGANE, S; PARANJPE, SV; KHUSPE, SS; MASCARENHAS, AF; THENGANE, S. 1986. **Hybridization of *Gossypium* species through in ovulo embryo culture**. *Plant Cell, Tissue and Organ Culture*, 6: 3, 209-219; 19 ref.

Following a cross between the sexually incompatible species *G. hirsutum* and *G. arboreum*, 8 to 12-day-old ovules were excised and cultured on modified Beasley & Ting (BT) medium. Plantlets were regenerated by a procedure involving sequential transfer between 5 different modified BT media. Compositions of all media are given. Cytological studies confirmed the hybrid nature of the regenerated plants.

756 THOMBRE, MV. 1985. **Genetic studies in yellow foliage mutants in *G. hirsutum* cotton**. *Current Research Reporter, Mahatma Phule Agricultural Univer sity*, 1: 1, 107-108; 3 ref.

Analysis of segregation data from the F1, F2 and BC1 of crosses involving the mutants EC285 and Lyf (the latter from the cultivar Laxmi) revealed that yellow foliage is conditioned by a different recessive gene in each mutant. The segregation data were similar to those obtained by other workers from interspecific crosses involving a yellow-foliage mutant of *Gossypium hirsutum* (conditioned by v1 = virescent-1) and one of *G. barbadense* (v7), details of which are provided.

757 ZIA-UL-ISLAM. 1991. **Estimation of combining abilities of some cotton genotypes and manifestation of heterosis by their hybrids**. UAF, Pakistan. 124 p.

Tissue culture

758 KHADI, BM; ARIPDJAVOV, SHA; USANOV, M. 1991. **Comparative study of ultrastructural organization and DNA content in cell and cell organelles of callus tissue, stem and leaves of cotton**. *International Symposium on Plant Biotechnology and its Contribution to the Improvement, the Implication and Development of Plants*. University of Agricultural Sciences, Dharwad, A.R.S., Dharwad.

759 KHADI, BM; KATAGERI, IS; MOGALI, SUMA. 1994. **Scope of tissue culture in *Gossypium spp.*** *National Seminar on cotton Production Challenges in 21st century*. (Hissar, Haryana: 1994: Aprl 18-20).

760 KHADI, BM; KATAGERI, IS. 1994. **Tissue and embryo culture in gossypium sp (1994)**. *National Seminar on cotton Production Challenges in 21st century held at CCS, Haryana Agricultural University, Hissar from April, 18-20*. (Hissar, Haryana: 1994: Apr 18-20).

761 MIRZA, MUHAMMAD ANWAR; SHEIKH, ABDUL LATIF. 1984. **A review of tissue culture progress in *Gossypium* species and their hybrids**. *Pakistan Cottons*, 28: 1, 49-53; 19 ref.

The development of procedures for somatic cell, anther, pollen and protoplast culture for this genus is surveyed.

Crotalaria

762 KABIR, G; AMIN, MN; MANNAN, A. 1989. **Karyotype studies in four species of *crotalaria***. *Rajshahi University Studies (part-B)*, 17: 29-38.

763 MALIK, CP; BINDRA, JAGPREET; MANGAT, GS. 1989. **The role of CO2 and organic acids in lipid biosynthesis during pollen tube growth in *Crotalaria juncea***. *Plant Cell Incompatibility Newsletter*, No. 21: 34-43; 12 ref.

Pollen cultures were subjected to CO2 and 1 μCi of (1-14C)-acetate per ml of culture medium, and lipids subsequently extracted and analysed. CO2 at 1% increased the incorporation of radioactive acetate into total and polar lipids. Among non-polar lipids it promoted acetate incorporation in sterols only, but reduced incorporation in free fatty acids, triglycerides and sterol esters.

764 RAO, IVR; RAO, IU; RAM, HYM; PREMA, K. 1985. **Protoplast isolation, culture and plantlet regeneration from cotyledons of sunn hemp (*Crotalaria juncea*)**. *Current Science*, 54: 19, 983-986; 22 ref.

Cell wall formation was initiated 48 h after plating isolated protoplasts from cotyledons of 6-day-old seedlings on modified Gamborg B5 medium. Divisions occurred, and after 3-4 weeks colonies were transferred to fresh medium until they formed small calluses. After transfer to a differentiating medium, somatic embryogenesis was observed. Plantlets were regenerated from shoot buds from the callus.

765 SHARMA, N; SHIVANNA, KR. 1983. **Pollen diffusates of *Crotalaria retusa* and their role in pH regulation**. *Annals of Botany*, 52: 2, 165-170; 18 ref.

Details of the release of proteins and amino acids from cultured pollen grains and the role of the leached metabolites in pollen germination, pollen tube growth and regulation of pH of the culture medium in *C. retusa* were investigated. In unbuffered media, satisfactory pollen germination and tube growth occurred over a wide range of pH values 4-9. This was related to the ability of pollen diffusates to shift the pH to 6.25 in all these media. Similar pollen germination and pH shift was observed when the pollen was eluted twice before culturing. When the pH shift was reduced by using buffered media, opt. germination and tube growth occurred only at pH 6.0. Pollen diffusates had a strong buffering capacity. Proteins and amino acids released from pollen did not seem to have a direct role in pH regulation. The components involved in pH regulation may originate from the pollen wall as well as from cytoplasm.

Hibiscus

766 AHMED, S. 1992. **Recovery of fertile backcross derivatives in a sterile interspecific hybrid of *Hibiscus*.** *Plant Tissue Culture*, 2: 1, 35-39.

In an attempt to breed a disease resistant variety of cultivar *Hibiscus cannabinus* (diploid), immature embryos obtained from the backcross between *H. cannabinus* and the almost completely sterile and vigorous triploid F1-H. radiatus x II cannabinus were cultured in vitro. Of all the media tried best results were obtained in MS + 0.2 mg/l IBA + 100 mg/l adenine sulphate + 2% sucrose. The BC1s were fully fertile, vigorous and resembled the cultivar female, *H. cannabinus* in the majority of characters; and male and F1 in respect of absence of branches, average number of nodes, number of bracts, indehiscent fruit character, seed index and fibre length.

767 RAHMAN, MA; GOMES, J; ISLAM, AS. 1992. **An electrophoretic study of soluble protein pattern, ADH and MDH isoenzyme bands in F1 hybrids *Hibiscus sabdariffa L.* X *H. cannabinus L.*** *Indian Journal of Genetics and Plant Breeding*, 51: 3, 320-325.

Agave

768 DAS, T. 1992. **Micropropagation of *Agave sisalana*.** *Plant Cell, Tissue and Organ Culture*, 31: 3, 253-255.

769 SINGH, K. 1984. **Agave hybrid - a useful sisal type for India.** *Jute Development Journal*, 4: 2, 34-36.

When the hybrid *A. amaniensis* X *A. angustifolia* was grown at sites in Orissa, Bihar, Madhya Pradesh and West Bengal, average fibre yield was 70% to 80% above that of *A. sisalana*.

Jute

770 ABDULLAH, ABM; RAHMAN, MH; RAHMAN, SMB. 1986. **Studies on differently treated jute fabrics for geotextile uses, Part-I.** *Bangladesh Journal Jute and Fibre Research*, 11: 1&2, 35-38.

771 ABDULLAH, ABM; RAHMAN, MH; RAHMAN, SMB; LATIFA BINTE, L; UDDIN, AU. 1992. **Studies on the properties of modified geojute/geotextiles. Part-II.** *Journal of Bangladesh Academy of Sciences*, 16: 2, 235-240.

772 ABDULLAH, ANM; RAHMAN, MH; RAHMAN, SMB; LATIFA BINTE, L; ALAM, MM; UDDIN, AH. 1992. **Studies on the properties of composite treated geojute/geotextile. Part-III.** *Journal of Bangladesh Chemical Society*, 5: 1, 53-57.

773 AHMAD, S; MAHBOOB, S. 1995. **Effect of an antioxidant on the stimulation of shoot differentiation in jute explants in vitro culture.** *Annual Plant Tissue Culture Conference*. (Dhaka University, Dept. of Botany: 1995: March 19).

774 AHMED, G; HOSSAIN, ABMM; ISLAM, MS. 1989. **Regeneration of multiple shoots in jute *Corchorus olitorius (var. 04)* from cotyledon and hypocotyl explants of germinating seeds.** *Indian Journal of Experimental Biology*, 27: 4, 334-337; 11 ref.

Callus formation and differention were investigated in cv. 04 plumule, hypocotyl and cotyledon explants grown on MS medium supplemented either with 2,4-D or with tyrosine and benzyladenine or kinetin. Callus formation was greatest with the 2,4-D supplement. The best multiple shoot regeneration was observed on MS medium with 0.5 mg benzyladenine + 50 mg tyrosine/litre. Most shoots/explant were regenerated from hypocotyls with plumules still attached. The shoots thus raised produced roots most sucessfully on MS medium with 3 mg nordihydroguaiaretic acid + 0.3 mg IBA/-litre.

775 ARA, C; MOHIUDDIN, G; KHAN, NH; AHAD, MA; TALUKDER, SH. 1992. **Chemical studies of jute plants at different stages of their growth.** *Bangladesh J. Fib. Res*, 17: p. 111-115.

776 ARANGZEB, S. 1990. **Variants obtained from a cross between *Corchorus* trilocularis and *Corchorus capsularis*, variety, D-154.** *Proceedings of the First National Symposium on Plant Breeding in Bangladesh*. Plant Breeding and Genetics Society of Bangladesh, Dhaka, p. 108-112.

More than 150 Tri-cap variants were obtained from a cross between *Corchorus trilocularis (wild) Bita* and *C. capsularis*, variety D-154. The type of variants include (1) Tall unbranched plants with green (P(o)) to red (P7) pigmentation, (2) branched short, plants with (P(o)) to P5 pigmentation, (3) highly fertile plants, (4) plant with different fruit shape and texture, (5) blue seeded P(o) types with white fiber and stick, (6) variants with

different leaf shape, (7) much branched variants, all the branches are tall like the main stem, (8) high yielding disease (stem-rot, anthracnose and leaf mosaic) resistant types accompanied by other desirable characters (9) quick growing early types and late maturing types, (10) either leaf mosaic or stem-rot resistant lines or lines resistant to both, (11) plants with uniform diameter, (12) short day-tolerant lines and (13) short plants with broad leaves suitable for kitchen vegetables.

777 BHATTACHARYA, S; MUKHERJEE, BB. 1983. **IAA-oxidase activity in different conditions of growth and rooting in jute (*Corchorus olitorius*) callus**. *Indian Journal of Experimental Biology*, 21: 6, 347-349; 22 ref.

Freshly isolated cotyledonary callus formed roots on Murashige and Skoog medium supplemented with 15% coconut milk, but gradually ceased to differentiate when subcultured. Rooting was restored on the same medium supplemented with 0.1 mg/l kinetin. In fresh and old callus (rooting restored), rate of rooting was directly correlated with IAA-oxidase activity. However, the relationship between growth value (final weight : initial weight) and IAA-oxidase activity was direct in fresh callus and inverse in old callus.

778 BHATTACHARYYA, D; BASU, S; CHATTAPADHYAY, JP; BOSE, SK. 1985. **Biocontrol of *Macrophomina* root-rot disease of jute by an antagonistic organism, *Aspergillus versicolor***. *Plant and Soil*, 87: 3, 435-438; 12 ref., 1 tab.

Aspergillus versicolor was grown in a soil-compost medium at pH 4.0 for 10 days under diffused light. This medium subsequently controlled experimental infection of jute by *Macrophomina phaseolina* by up to 56% in a pot culture experiment.

779 BHUIYAN, MAM; RAHMAN, MH; MOHIUDDIN, G; MOFIZULLAH, AKM. 1978. **Rot-proofing of jute materials. Part II.** *Bangladesh J. Fib. Res.* 3: 33-37.

780 BISWAS, PK. 1991. **Direct and indirect effects of yield components in *Corchorus capsularis*, *C. olitorius* and their stable recombinants**. *Bangladesh Journal of Jute and Fibre Research*, 16: 1-2, 123-128.

Direct and indirect effects of six yield components of 50 strains, of which 20 white, 20 tossa and 10 stable interspecific hybrids have been worked out at both the phenotypic and genotypic levels of correlations. Plant height and stick yield contributed mostly towards fibre yield in white jute (*C. capsularis*) and recombinant types respectively. In tossa jute (*C. olitorius*) stick yield, nodes per plant and plant height would be the selection index for higher fibre yield.

781 GOMES, I; MOHIUDDIN, G. 1988. **Comparative studies on the degradation of jute fibre by several fungal strains**. *Bangladesh Journal of Microbiology*, v. 44.

782 GOMES, I; SAHA, RK; MOHIUDDIN, G; HOQ, MM. 1992. **Isolation and characterization of cellulose free pectinolytic and hemicellulolytic Thermophilic Fungus**. *World Jute Micro. Biotech*, 8: 589-592.

783 GOMES, I; MOHIUDDIN, G. 1988. **Jute fibre, a substrate for celluase and hemicellulases production**. *Bangladesh Journal of Microbiology*, v. 38.

784 HALDER, SK; SERAJ, ZI. 1992. **Cell suspension cultures in three varieties of jute (*Corchorus spp.*)**. *Plant Tissue Culture*, 2: 1, 15-20.

Friable calli of *Corchorus capsularis* var. D-154, var. CVL-1 and *C. olitorius* var 0-4 were obtained by subculturing compact calli. On media MS + BAP + tyr and MS + BAP + tyr + NDGA hypocotyl segments were used as inoculum for suspension cultures. The friability of callus was greater in media containing NDGA. Optimum growth curves were obtained for suspension cultures in MS + BAP + 2, 4-D. Maximum growth of cells in the latter medium was obtained in 8-11 days after which the suspension was subcultured. Organogenic nature of the cells in suspension was checked using specific activity of the enzyme glyoxalase-I as a marker. 2, 4-D, when added as a growth factor to the medium decreased the organogenic potentiality of cells in suspension. A minimum amount of 0.25 mg/l of 2, 4-D was required to maintain the suspension cultures. Some of the cells showed the presence of starch granules suggesting organogenic nature of cells. Planting out of such cells on 2, 4-D free semisolid MS resulted only in root differentiation.

785 HOQ, MM; ALAM, M; MOHIUDDIN, G; GOMES, I. 1992. **Enzyme biotechnology in developing countries: Production and application of Thermostable xylanase in jute fibre upgradation**. *Proc. of Ninth Int. Biotech. Symp. and exposition*. American Chemical Society: p. 568-572.

786 HOSSAIN, A; AHMAD, G; ISLAM, MS. 1995. **Development of agrobacterium mediated genetic transformation system in jute**. *Annual Plant Tissue*

Culture Conference. (Dhaka University, Dept. of Botany: 1995: March 19).

787 HOSSAIN, ABM; AHMED, G; ISLAM, MS. 1993. **Single and synergistic effects of some vitamins and antioxidants in the control of early senescence in the regenerated plants of *Corchorus olitorius*.** *International Plant Tissue Culture Conference*. (Dhaka Univ., Dept. of Botany: December 19-21)

788 ISLAM, AS; RAHMAN, SMZ. 1986. **Plant regeneration in jute**. *Newsletter, International Plant Biotechnology Network*, No. 6: 10.

Seeds of 2 cultivars each of *Corchorus capsularis* and *C. olitorius* and advanced generations of *C. olitorius* X *C. aestuans* were taken 17 h after germination had commenced, and cultured, following removal of the testa, endosperm, root tips and in some cases also cotyledons, on modified Murashige & Skoog medium. Within 20 days, fused multiple shoots were observed on all material except one cultivar of *C. olitorius*. The number of shoots ranged from 10 to 30, depending on the variety. The shoots were subsequently rooted and transplanted to pots.

789 ISLAM, AS. 1993. **Prospects of in vitro techniques for improvement of jute - an overview**. *International Plant Tissue Culture Conference*. (Dhaka Univ., Dept. of Botany: December 19-21).

790 ISLAM, R; BHUIYAN, AM; ISLAM, R. 1978. **Effect of retting on hemicelluloses of jute at different time intervals**. *Bang. J. Jute. Fib. Res.* 3: 1-3, 7-17.

791 ISLAM, R; AHMAD, NILUFAR; ISLAM, RAFIQUL. 1981. **Enzymic degradation of jute fibre, isolation and identification of different fungal responsible for degradation and the study of their cellulolytic activity**. *Bangladesh J. Jute and Fibre Research*. 6: 1-2, 67-78.

792 MANZOOR-I-KHUDA, M; ISLAM, R. 1970. **Chemical constituents of *C. olitorius* and *C. capsularies*. Part I. Identification of sugars from the roots and seeds of jute plants**. *Pakistan J. Scientific and Indus-trial Research* 13:3, 234-35.

793 MOHIUDDIN, G; KASHEM, A; GREEN, J. 1987. **A simple modified method for detecting cellulose activity in micro-organisms**. *Bangladesh J. Jute and Fibre Research*. 12: 83-84.

794 MOHIUDDIN, G. 1983. **Biodegradation of jute lignin for profitable uses**. *Jute and Jute Fabrics, Bangladesh*, 9: 7-10.

795 MOHIUDDIN, G; CHOWDHURY, I; KABIR, R; HASEB, SA. 1979. **Chemical constituents of jute cuttings. Part II. determination of cellulose and hemicellulose**. *Bangladesh J. Fib. Res.* 4: 27-32.

796 MOHIUDDIN, G; TALUKDER, SH; HASIBS, SK. 1981. **Chemical constituents of jute cuttings. Part I. Determination of pectin and wax**. *Bangladesh J. Fib. Res.* 6: 75-81.

797 MOHIUDDIN, G; KASHEM, A; RAHMAN, H; TALUKDER, SH. 1985. **Degradation of jute cuttings by *P. gigantic***. *Annual Conference of Bangladesh Society of Microbiology*.

798 MOHIUDDIN, G; GOMES, I; HAQUE, MS. 1986. **Effect of different weighing materials on the quality of fibre during retting**. *Bangladesh J. Fib. Res.* 11: 13-17.

799 MOHIUDDIN, G. 1985. **Enhancement of microbial growth for the improvement of jute cuttings.** *Bangladesh J. Fib. Res.* 10: 1-6.

800 MOHIUDDIN, G; AMIN, H; TALUKDER, SH; ARA, C. 1991. **Improvement of jute cuttings by pectinolytic enzymes**. *Bangladesh J. Fib. Res.* 16: 19-22.

801 MOHIUDDIN, G. 1994. **Jute geotextiles**. *2nd International Workshop on Geotextiles*. (IJO, Dhaka: 1994: January 11-12).

802 MOHIUDDIN, G; TALUKDER, SH; MIA, M. 1978. **Lignin content of jute-cuttings in the white and tossa varieties of Bangladesh Jute**. *Bangladesh J. Fib. Res*, 3: 33-37.

803 MOHIUDDIN, G; TALUKDER, SH. 1994. **Production and applications of fungal enzymes for the improvement of low grade jute fibres**. *(16th Int. Congress of Bioch. and Molecular Biol., Vol II)*, p. 133.

804 MOHIUDDIN, G. 1987. **Protein in jute leaves**. *Sonali Ansh (Bangladesh)*, p. 72-78.

805 MOHIUDDIN, G. 1980. **Role of pectin in softening of jute cuttings**. *Jute and Jute Fabrics (Bangladesh)*, p. 6-8.

806 MOHIUDDIN, G. 1990. **Softening of jute cuttings**. *Sonali Ansh (Bangladesh)*, p. 71-78.

807 MOHIUDDIN, G. 1984. **Softening of jute cuttings and effect of different concentrations of urea in piling bin.** *Bangladesh J. Fib. Res.* 9: 31-35.

808 MOHIUDDIN, G; TALUKER, SH; MIA, M. 1978. **Softening of jute cuttings using *Bacillus* subtils**. *Bangladesh J. Fib. Res.* 3: 21-26.

809 MOHIUDDIN, G; CHOWDHURY, I; RAHMAN, H; HASIBS, AKA. 1983. **Softening of jute cuttings using *B. megatarium***. *Bangladesh J.Fib.Res.* 8: 37-41.

810 MOHIUDDIN, G; BHUIYAN, AM; HASIBS, SA. 1983. **Softening of jute cuttings using chemicals in the form of nutrients**. *Bangladesh J. Fib. Res.* 8: 37-41.

811 MOHIUDDIN, G. 1991. **Techno-economic benefits of enzyme application in the jute mill**. *(International Workshop held at IJO, Dhaka on 10th May, 1992).*

812 MOHIUDDIN, G. 1992. **Upgrading of low grade jute and cuttings part. I Microbiol activity and its enhancement by using of chemicals**. *Jute Text Institute*, 83: 527-531.

813 MOHIUDDIN, G; TALUKDER, SH; JAIN, DK; LUTFAR, LB; LEDUY, ANH. 1992. **Upgrading of low grade jute and cuttings part II. Interaction between jute fibres and microbial enzymes**. *Jute Text Institute*, 83: 532-536.

814 MOHIUDDIN, G; TALUKDER, SH; LUTFAR, LB; SOBHAN, MA; KABIR, MK. 1992. **Upgrading of low grade jute and cuttings part III. large application and the processing of jute fibres by means of enzymes**. *Jute Text Institute*, 83: 537-541.

815 MOHIUDDIN, G. 1979. **Utilization of jute cuttings**. *Jute and Jute Fabrics, Bangladesh*, 5: 5-7.

816 RAHMAN, M; HAQUE, E; SERAJ, ZE; HASAN, M; RAHMAN, M. 1993. **Establishment of highly efficient regeneration and transformation in jute, *Corchorus capsularis var. D-154***. *International Plant Tissue Culture Conference*. (Dhaka Univ., Dept. of Botany: December 19-21)

817 RAHMAN, MA; MATIN, BA; MAFIZULLAH, AKM. 1982. **Studies of Physical Changes during Softening of Jute Cuttings in pile**. *Bangladesh J. Jute Fib. Res.* 7: 1&2, 53-62.

818 RAHMAN, MA. 1991. **Studies on the Improvement in the Current Practice of Softening and Piling of Jute Cuttings**. *Bangladesh Journal of Jute and Fibre Research*, 16: 1-2, 101-105.

819 RAHMAN, MA. 1982. **Upgradation of jute cuttings**. *Jute and Jute Fabrics, Bangladesh*, 8: 1.

820 RAHMAN, MH. 1990. **A review on rot proofing of jute materials; part-I**. *Jute and Jute fabrics Bangladesh*, 16: 10, 7-11.

821 RAHMAN, MH; MOHIUDDIN, G. 1988. **Biodegradation of jute and its products and their protective measures**. *13th Annual Bnagladesh Science Conference*. Bangladesh Association of Advancement of Science, Dhaka, p. 7-8.

822 RAHMAN, MH; BHUIYAN, MAM; MOHUDDIN, G; MOFIZULLAH, AKM. 1979. **Studies on the degradation pattern of jute during rotting**. *Bangladesh J. Fib. Res.* IV: 21-26.

823 RAHMAN, MH; BEGUM, MJ; ABDULLAH, ABM. **Studies on the rodent proofing of geojute/goetextiles. Part-IV**. *Bangladesh J. Jute Fib. Res.*

824 RASHIDA, I; SURAIYA, A; RAFIQUL, I; SELINA, A. 1990. **Effect of fertilzer on different constituents of jute. Part-I, effect of fertilizer**. *Bangladesh J. Jute Fib. Res.* 15: 1-2, 65-72.

825 SAHA, T; SEN, SK. 1991. **Somatic embryogenesis in protoplast derived calli of cultivated *Corchorus capsularis L.***. *Plant Cell Reports*, 10: 12, 633-636.

826 SERAJ, ZI; SARKER, AB; ISLAM, AS. 1993. **Plant regeneration in a jute species (*C. capsularis*) and its possible relationship with glyoxalase-I**. *Plant Cell Reports*, 12: 1, 29-33.

827 SHAMSUDDIN, A. 1992. **In vitro approaches to interspecific hybridisation and chromosome manipulation in jute and kenaf**. *Specialized Techniques in Jute and Kenaf Breeding: Proceedings of the IJO/BJRI Training Course*. Breeding Division, Bangladeh Jute Research Institute, Dhaka, p. 305-321.

828 SIHRIN, M; ARANGZEB, S; AHMAD, S. 1991. **In vitro culture of immature ovule of the two cultivated species of the genus *Corchorus* and their hybrids**. Bangladesh Jute Research Institute, Dhaka.

829 TALUKDER, SH; MOHIUDDIN, G; HASIBS, SKA; MARZINA, A; GOMES, I; LUTFUR, LB. 1994. **Production of jute cuttings softening enzymes by two fungal strains in solid state fermentation**. *Bangladesh J. Fib. Res.* 16: 89-92.

830 TALUKDER, SH; MOHIUDDIN, G; AHMED, K; ARA, C; RAHMAN, MS. 1992. **Quality improvement of low grade jute and cuttings using crude enzymes from *A. niger***. *Bangladesh J. Microbiology*, 9: 37-41.

Insect pests

831 PANDIT, NC; SOM, D. 1988. **Culture of *Beauveria bassiana* and its pathogenicity to insect pests of jute (*Corchorus capsularis* and *C. olitorius*) and mesta (*Hibiscus cannabinus* and *H. sabdariffa*)**. *Indian Journal of Agricultural Sciences*, 58: 1, 75-76; 4 ref.

The effects of different amino acids on the growth of the entomopathogenic fungus *Beauveria bassiana* on soyabean grits and its pathogenicity to insect pests of jute, roselle and kenaf collected in the field in West Bengal, India were investigated. A potato-dextrose agar medium was most suitable for the maintenance of *B. bassiana* cultures and soyabean chunks medium was most suitable for mass production. Of 5 amino acids, DL-alanine gave the quickest growth response; 15 days after treatment, the fungal mass of *B. bassiana* had increased by 45%. The chrysomelid *Nisotra orbiculata*, the curculionid Desmidophorus hebes, the noctuid *Anomis sabulifera* and *Apion corchori* had 80, 65, 68 and 14% mortality, respectively, 7 days after inoculation with spores of *B. bassiana*.

832 ZAMAN, M; KARIMULLAH. 1987. **Relative abundance of yellow mite, *Polyphagotarsonemus latus (Banks)*, on six cultivars of jute in Peshawar**. *Pakistan Journal of Zoology*, 19: 2, 133-139; 17 ref.

The relative abundance of the tarsonemid *Polyphagotarsonemus latus* on 6 cultivars of jute was studied in Pakistan in 1981. The pest appeared in mid-season and remained until the crop matured. On the basis of pooled data, the order of preference seemed to be C.G. (mean population density of 4.5), Nepal-1 (3.5), D-154 (2.0), Yue-Yuan No. 5 (1.9), Nepal-2 (1.7) and Sunkukra (0.06). The mite was most abundant on the ventral leaf lamina of young leaves. The predatory phytoseiid *Amblyseius delhiensis* was usually observed in association with *P. latus*. The population density of *P. latus* was positively correlated with temperature for all 6 cultivars and postively correlated with relative humidity for 5 of the 6.

STARCH CROPS

833 BHANSALI, RR; SINGH, KISHAN. 1982. **Callus and shoot formation from leaf of sugarcane in tissue cultures**. *Phytomorphology*, 32: 2/3, 167-170; 13 ref.

Calluses were established from leaf explants of the *Saccharum officinarum* cultivars Co419, CoJ64 and Co1148 on Murashige & Skoog's medium supplemented with 2,4-D. A 2,4-D concentration of 2.5 mg/litre was optimal for callus formation whereas both calluses and adventitious roots were formed with NAA (5.0 mg/litre) and IAA (7.5 mg/litre). L-cysteine-HCl reduced polyphenol production by the explants. Shoots formed when 2,4-D was absent from the medium. Co419 produced the most shoots, followed by CoJ64 and Co1148.

834 BHANSALI, RR; SINGH, KISHAN. 1991. **Grassy-shoot mycoplasma-free sugarcane plantlets from apical meristems of lateral buds**. *Indian Phytopathology*, 44: 3, 291-294; 15 ref.

Apical meristems of healthy sugarcane cv. Co 1148 plants and from plants infected by mycoplasma-like organisms were grown on modified Murashige and Skoog and White basal media. Shoot apices elongated into leafy shoots within 30 d and formed roots and root hairs when placed on media containing plant growth regulators. C. 30% of plantlets derived from infected bud apices were free from symptoms of grassy shoot disease and the number of disease-free plantlets increased to 50% when apices of <1 mm were used. Calli were developed from healthy and diseased bud apices on Murashige and Skoog media supplemented with 2,4-D at 3 mg/litre. The rate of callus growth was slower in diseased callus tissues than in healthy ones.

835 DHAMANKAR, VS. 1992. **Molasses, a source of nutrients for in vitro sugar cane culture**. *Sugar Cane*, No. 4: 14-15; 12 ref.

Leaf explants of sugarcane cv. Co.7219 were cultured in media containing 0.5-5% molasses (composed of 30-40% sucrose, 4-9% glucose, 5-12% other reducing sugars, 2-5% starch and gums, 2-4% protein and 0.5-1.5% non-nitrogenous acids), or on a modified Mura-