- **Technology Fee for Bt Cotton**

  In the past decade, private companies invested heavily in biotechnological research on cotton for finding genes suitable for producing chemicals injurious to target insects. For years gene insertion, laboratory testing and field trials and regulatory requirements have needed both patience and investment. In 1996/97 transgenic cotton became a reality in the USA and Australia as a significant area was grown under insect resistant varieties. Herbicide tolerant varieties were also grown on a commercial scale. The private companies who own the technology or the seed impregnated with the resistant gene sold the technology to farmers at a rate per unit area. Each farmer interested in growing insect resistant Delta and Pine Land Bt varieties had to sign an agreement with Monsanto. Three important conditions of the agreement included a fee for technology, which was uniform for all farmers and varieties; a commitment neither to pass on the seed to other growers nor keep it for the next year; and planting of a refuge crop. Technically, if the seed is pure, it can be used for planting the next year without losing the benefits of the foreign gene(s).

  During 1996/97, every Bt cotton grower in the USA paid US$80/ha for the Bollgard technology. It was assumed that the technology would save at least US$80/ha to the farmer in insecticide spraying or enhanced yield. If the insect control is better that insecticide spraying, dual benefits could be achieved. In the USA, about 60% of Bt cotton growers were able to eliminate insecticide spraying against bollworms especially tobacco budworm. For the remaining 40%, limited supplemental spraying was required. However, some area due to unusually high insect pressure during 1996/97 demanded traditional spraying.

  Australian Bt cotton growers were not allowed to transfer seed or keep it for next year either, and they were obliged to grow a refuge crop. They had to pay US$245/ha for the technology. However, due to concerns from the farmers, the agreement also included the following two conditions.

  - Monsanto will compensate growers if the cost of controlling insects in Bt cotton is more than the cost of controlling insects in an equivalent conventional crop.
  - If growers spray Bt cotton more than two times with conventional sprays, they will receive a rebate of US$25 for each hectare of Bt cotton they grow during 1996/97.

  Monsanto has announced that the technology fee for US cotton growers will remain the same (US$80/ha) during 1997/98. Roundup Ready herbicide resistant cotton, which is available for the first time, has been priced at the rate of US$12/ha for stripper cotton and US$20/ha for the picker cotton varieties. The company has also announced that a limited quantity of bollworm resistant and Roundup Ready resistant seed will be available for the first time during 1997. The technology fee for both genes together in one variety will be US$100/ha. The technology fee does not include the additional cost for the Bt seed charged by seed companies. Although insecticide resistance or herbicide resistance involves the same technology to develop transgenic cotton, the price for the technology is based on the value to the farmer. Thus, the fee for the Bollgard gene higher than Roundup Ready. On the basis of experiments, it is claimed that Bollgard cotton could bring about US$150/ha more return to the farmer than conventional varieties.

  A number of Bollgard varieties of Deltapine, Paymaster and Stoneville origin will be available for planting during 1997. However, NuCOTN 33^{B} and NuCOTN 35^{B} will be the major varieties. It is estimated that Bt cotton with a

Bollgard gene will be planted on a total area of 1-1.1 million hectares during 1997. At least 7 different varieties of Roundup Ready cotton will be planted on about 250,000 hectares. Four varieties having both the Bollgard and Roundup Ready genes will be planted on a significant area for the first time during 1997/98, mainly for seed increase purposes. The targets are to plant insect resistant transgenic varieties on 1/3 of the total cotton area in the USA.

Stoneville Pedigree Seed Company is offering bromoxynil resistant cotton varieties trademarked as BXN. Two varieties, BXN 57 and BXN 58, were grown on over 20 hectares during 1996/97. During 1997/98, BXN 58 will not be planted but BXN 47 and BXN 57 will be grown on 100-120,000 hectares. BXN 47 has been derived from ST 474, which was released for commercial cultivation in 1994. The Stoneville fee for technology is not based on unit area. Rather, it is based on the quantity of seed, which will work out close to US$15/ha. Stoneville Pedigree Seed Company will be offering herbicide plus insecticide (Bollgard gene) resistant varieties during 1998. Stoneville will price and sell its BXN with Bollgard seed to growers who have purchased a Bollgard license from Monsanto. The BG+BXN variety to be available in 1998 will be BXN 4740 which is again derived from ST 474.