Indian J. Pl. Genet. Resources 2(2) : 182-183, 1989

Short Communication

Collecting Cotton in Bhutan

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Bhutan, situated in the Himalayan ranges lies to the north of West Bengal and Assam, and west of Sikkim between longitude 89° and 92° east and latitude 28° north of equator. It is a hilly country interspersed with mountains and valleys, varying in altitudinal ranges and climatic diversity. The temperature ranges from mild in foot hills to icy cold on high altitudes. The congenial edaphic and climatic factors in foot hills have circumscribed the cotton cultivation upto an altitude of 800-1000 metres only. It is said that about 20-25 years back, cotton was frequently cultivated in the eastern parts of Bhutan in the districts of Samdrup Jongkar, Shumar, Tashigang, Mongar, Shemgarg and Chirang. However, the area under cotton has since then reduced considerably first due to uneconomic return from this crop and secondly due to competition from better remunerative crops like chillies. In 1978, under the Indo-Bhutanese agreement at the inviation of Royal Government of Bhutan, the author was deputed to look into the declining trend of cotton growing and to suggest ways of improvement in its cultivation. Extensive touring indside the cotton growing districts of Bhutan was undertaken and the following diverse type of cotton material was collected.

Gossypium barbadense

About three metres tall perennial plants with many monopodial branches bearing three lobed leaves and three loculed small bolls, were found growing in back yards of houses and in gardens. This type of cotton is being grown for lint used for worship. The plants were free from sucking pests like jassids (*Amrasca* spp.), but their bolls were damaged (50 per cent incidence) by boll worms. These perennial plants were the constant source of bollworm for other cotton species. Seeds of this cotton were naked, 7-8 in number per loculus, with average 100 seed weight around 9.5 g, lint 36.6, per cent fibre short (25 mm) and coarse (5.32 micronaire value and 209 millitex). The perennial *barbadense* plants were found in districts of Samdrup, Jongkar, Sumar and Tashigang. The origin and antiquity of perennial *barbadense* could not be ascertained. However, it is felt that it could be an introduction from African countries.

Gossypium hirsutum

Two annual upland types belonging to *G. hirsutum* were found in cultivation. One of them in Yalang village of Shumar district at a height of 1000 m, in a flat land was characterised by essentially sympodial habit with 7th first fruiting node number. The plants were free from sucking pests like jassids even without plant

protection measures. The bolling potential was quite high (about 40-50 bolls/ plant) with about 2.5 g seed per boll. Bolls were 3-5 loculed with 6-7 seeds per loculus. The ginning out-turn of this type was 35.8 per cent. The fibre was short and comparatively coarse. The other type was found in cultivation in a village in Tashigang District. Its fibre was shorter and more coarser than former type with lower ginning (31.3 per cent). Both upland types mentioned above have probably been introductions from northern India belonging to race *latifolium* of *G. hirsutum.*

Gossypium arboreum

Cotton belonging to *Gossypium arboreum* was extensively grown in the districts of Samdrup, Jonkar, Shumar, Tashigang, Mongar, Shemgang and Chirang about 20-25 years back. However, its cultivation has declined to a considerable extent. Four different types of samples were collected from villages Yalang, and Yajor of district Shumar and also from two different villages in distrtcts of Mongar and Tashigang. The plants of all four types were annual, essentially sympodial with deeply laciniated five lobed leaves, yellow petals with red spot. Bolls were mostly three loculed with ten seeds per loculus with average seed cotton of 2.25 g per boll. Fibre length ranged from 17 mm to 20 mm. The fibre was coarse with micronaire value of 5.85 to 7.50, and millitex 230 to 295. The most distinguishable feature was the value of ginning out-turn. The two samples viz. A_1 (from village Yajur, district Sumar) and A_2 (from Mongar) were characterised by low G.O.T. (31.0 per cent) while the other two samples viz. A_3 (village Yalang, district Sumar) and A_4 (from Tashing) were high ginner (37.4 to 39.8 per cent). The incidence of boll worms in these two types was also comparatively lower than A_1 and A_2. Though all the *arboreum* types have shown high degree of resistance to boll worms showing upto 2.0 per cent incidence as compared to 44-50 per cent in *G. hirsutum* types. The four types are currently being studied in detail for their behaviour for boll worm incidence under Delhi conditions where they are being maintained in *arboreum* germplasm collection.

The four *arboreum* types could be classified in two groups. The first group with low G.O.T. may represent race *burmanicum* while the other group comprising A_3 to A_4 of high ginner types may represent race *cernuum* which might have gone from Assam area of India.

The *arboreum* germplasm collected from Bhutan may be of great significance from boll worm resistance point of view. The germplasm not only needs thorough collection but also evaluation and conservation to make the full realization of the potential of this landrace diversity.