Natural Crossing in Cotton in Western Punjab

I. Natural Crossing in Contiguous Plants and Rows

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The sub-continent of India, which has now been divided up into the Indian Union and Pakistan, is the second largest cotton growing country of the world, and the agricultural departments in different provinces and states devote a great deal of time and attention to the improvement of this crop. Ramiah (14) has drawn up a list of 34 varieties of indigenous cotton and 18 of acclimatized American cotton which are at present under large-scale commercial cultivation in this country. Brown (4) has named 95 commercial varieties of cotton which are being grown in other cotton growing countries. This appears to be an underestimate, as cotton varieties are very “local” in their adaptation. Besides the commercial varieties there are many more under different stages of experimentation at different cotton breeding stations. With such a large number of varieties under cultivation, the maintenance of the purity must be a difficult task.

The cotton plant is liable to natural cross-fertilization in the field, and this is one of the major causes of “running out” of varieties (Cook, 6). As the commercial value of a cotton variety depends, amongst other things, on its even running quality year after year, diverse steps have been taken in different countries to ensure purity of the varieties. Laws have been enacted in some countries (Balls & Bedevian, 1) to stabilize seed-supply for sowing and for preventing mixing in the ginning factories. The same end is sought in the United States of America by developing what are commonly called one-variety-cotton-communities (Cook, 7, and Cook and Martin, 8), and Gerdes (11) has mentioned that, during 1944, there were 569 such communities in 736 cotton growing counties producing 40% of the cotton crop of the United States. It must be conceded that the establishment of one-variety-cotton communities is good insurance against the “running out” of varieties. In this way the seed-supply for the next crop can be secured from properly rogued fields (for discarding undesirable mutants and chance mixtures) from the center of the block. In this way supply scheme can either be drawn up or promulgated.

No work has so far been done on this problem in Pakistan, and the present work, therefore, undertaken to fill up this knowledge. As the environmental conditions in the cotton growing area of Western Punjab are very similar, these studies may have wide applicability in the whole cotton belt of the Dominion. A very broad-based program of work was undertaken during the 3 years 1945-47 and every aspect of the problem was thoroughly studied. So far as we are aware, the work under review is the only one so far reported in which such a large number of aspects of the problem have been investigated as an integral part of the whole program. It was, therefore, undertaken to fill up this lacuna in our knowledge before rules and regulations for a seed-supply scheme can either be drawn up or promulgated.

Material and Method

Both the local cottons (G. arboreum, V. bengalensis Hutchinson and Ghose) and the外国 18) has recorded that can cottons (G. hirsutum Linn) were kept under study. The most important commercial variety of each group, viz., 39-Mollisoni (local) and 4 F (American), were taken and natural crossing was studied by using red arboreum and red hirsutum as pollen bearing marker plants. The green leaved varieties were sown under a definite layout, so that natural crossing which took place could be recorded in a series of four papers, namely, “Natural Crossing in Contiguous Plants and Rows,” “Natural Crossing Under Field Conditions,” “Methods of Checking Natural Crossing,” and “Agents of Natural Crossing”. In this article the first problem of natural crossing in contiguous plants and rows is dealt with.

Literature Review

Webber (18) has recorded that 5 to 10% inbreeding occurs in varieties of Upland cotton and that no work has been done on this aspect of the problem. Sir George Watt (9) has recommended that annual roguing of the crops should take place, and that the entire produce of the single plants or rows, be, of the green leaved varieties was picked and sown during the next season. The number and dilute red tinge in the leaves and flowers was the result of such a crossing. The extent of natural crossing was expressed as a percentage of the dilute red tinge in the leaves and flowers of the plants in the entire population.