

in a new variety, which seems well adapted to western Tennessee conditions. This has been named Trice by Professor S. M. Bain.

Columbia cotton, a more productive long staple Upland, has continued to grow in favor in many parts of the eastern cotton-growing region. The question of marketing this grade of lint in the local short staple markets is the greatest problem in the introduction of this variety.

A STUDY OF LEAF CHARACTERS IN COTTON HYBRIDS.

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The leaf of the Upland cotton grown in the United States is palmate with from three to five rather shallow sinuses. That of Sea Island and Egyptian cottons is more deeply cleft, and certain Mexican cottons have their leaves reduced to very narrow lobes, usually five. Many of the Asiatic species have leaves in which the indentations are intermediate between the last two instances cited. In each group, however, the leaf type is fairly constant. Many Upland varieties have individual leaf characters, and most of the Upland long staple varieties have slightly deeper sinuses than the short staple types. Garden okra, *Hibiscus esculentus*, shows very great variability in its leaf forms, which go through as great a range as is found among the cottons.

Several varieties of Upland short staple cotton show a few plants of a type usually known among planters as "okra cotton." This type has been disseminated as a variety in the past, but has been found to have only limited value. The writer has found this type in fairly well selected fields of Jones' Improved, Shine, and King. It is more common in King than in the others, however. When breeding work was begun in Texas in the attempt to find varieties of cotton better adapted for culture in the weevil-infested region, an okra leafed type of King cotton was isolated. It was found to breed very true to type, and it would have been easy to multiply if it had shown signs of value, but it did not prove very productive.

In breeding cottons for various purposes, crosses have been made between strains, varieties, and frequently between species. These crosses have been very difficult to fix, especially where the relationship has not been close, as between Sea Island, or Egyptian, and Upland cotton. Very little has been published on the application of Mendel's law to cotton crosses. The variation in length of lint is so slight in most of the crosses made that it would hardly be possible to prove the application of Mendel's law to the lint character, though this is the most important

character to be considered. For this reason crosses were made between an okra-leaved form of King, and a variety of Upland cotton called Edson. Since this was to be applicable to ordinary breeding conditions, the first and later generation hybrids were not artificially inbred.

The cross was made in 1905 on five different plants and seven crossed bolls were secured. These were planted at Waco, Texas, in 1906, and about 75 plants were secured. These all had one leaf character, which was intermediate between the two parents, showing that neither leaf type is dominant, as shown in Figure 1. This generation was not hand pollinated and the plants stood in a row between rows of broad-leaved, Upland cottons. The seed from four of these individuals was planted at Palestine, Texas, in 1907, and one at Calvert, Texas. The result of these five progeny rows is shown below.

TABLE I.
Distribution of Progeny of First Year Hybrids in 1907.

PLANT NO.	PROGENY.		
	Upland Type.	Intermediate.	Okra-leaved Type.
1	28	57	25
2	20	41	13
3	22	38	13
4	37	60	35
5	22	51	15
Total	129	277	101
Percentages	25.4	54.6	20.0

Supposing that Mendel's law does apply here, the discrepancy in percentages from the number theoretically required may have had either or both of two causes:

1. The distinction between the intermediate and the okra-leaved types was not so marked as in the case of the other types. About 4½ per cent of the okra-leaved type may have been counted as intermediate.
2. In the case of cross-pollination by insects, it is possible that this might have had the same effect.

Twelve of these plants were planted the following year; six of the intermediate type and three of each of the parent types. The result of the three plants of the Upland type is shown in Table II.

The most probable explanation of the 19 intermediate plants in the progeny of plant 1 is that they were the result of crossing by insects with

TABLE II.
Distribution of Progeny of Upland Type, 1908.

PLANT NO.	PROGENY.		
	Upland Type.	Intermediate.	Okra-leafed Type.
1	139	19	0
2	135	0	0
3	90	0	0
Total.....	364	19	0
Percentages.....	95.0	5	

some of the adjacent okra-leafed plants in 1907. This does not show in either of the other numbers.

The six intermediate plants gave progeny distributed as follows:

TABLE III.
Distribution from Intermediate Type, 1908.

PLANT NO.	PROGENY.		
	Upland Type.	Intermediate.	Okra-leafed Type.
1	50	82	36
2	23	36	12
3	30	66	27
4	24	41	15
5	10	32	11
6	19	35	12
Total.....	156	292	113
Percentages.....	27.8	52.0	20.2

This is in at least as close accord with theoretical numbers as the record of 1907.

The distribution of the three okra-leafed progeny rows was as follows:

TABLE IV.
Distribution of Progeny of Okra-leafed Type, 1908.

PLANT NO.	PROGENY.		
	Upland Type.	Intermediate.	Okra-leafed Type.
1	0	40	29
2	0	56	51
3	0	5	40
Total.....		101	120
Percentages.....		45.7	54.3

The two types shown in this table were very much harder to distinguish this year than in 1907, and many okra-leaved plants may have been counted as intermediates. Had this condition been due to cross-pollination by insects with the adjacent Upland types, it should have left the distinction between the two forms as well defined as in 1907.

It seems to me that the close correspondence between tables I and III argues against any great amount of crossing by insects, and that the whole set of figures show a fairly close approximation to those required by Mendel's law. Moreover, it does not seem to hold out any very great hopes of fixing intermediate types of lint, should Mendel's law also apply to that character.

NOTES ON COTTON BREEDING IN NORTHERN GEORGIA.

By H. A. ALLARD.

LOW-LINTED AND LINTLESS COTTON-PLANTS.

No two plants in a cotton field ever meet with identical environmental conditions. As a result we note infinite variability in all the population as to size, shape, leaf position, etc., down to the finest details of structure. Other differences are of a more definite and stable character, and persist to a great degree, independently of immediate environmental influences. These plants may be grouped into more or less distinct classes or types, according to the size and shape of bolls, earliness, character of foliage, lint, etc. From the point of view of profitable cotton culture, not all these types are equally valuable. Some among these meet the requirements of particular soils, regions and purposes much better than others, and a few are at all times worthless and decidedly detrimental to the best interests of the growers.

With respect to the amount of lint on the seed, cotton plants show great variability. Scanty-linted or even quite lintless plants now and then occur in the best of cotton fields, and perpetuate these undesirable characters very uniformly. In nearly every field of cotton these low-linted types are more or less in evidence, but especially in those fields planted from mixed and unselected seed.

In the fall of 1907, the writer selected a striking specimen of lintless plant in one of the most productive cotton fields in North Georgia. This plant had only 5.5 per cent of lint on strictly smooth, black seed. In connection with the work of cotton breeding and field-demonstrative