STUDIES IN *DOLICHOS LABLAB* (ROXB.) AND (L.)—THE INDIAN FIELD AND GARDEN BEAN. II.

By G. N. Rangaswami Ayyangar, B.A., I.A.S.,
Agricultural Research Institute, Coimbatore,
and
K. Kunhi Krishnan Nambiar, B.Sc.Ag.,
Millets Breeding Station, Coimbatore.

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Seed Coat Colours—A Case of Linkage.

In *Dolichos lablab* (Roxb.) and (L.) there are three major seed coat colours, Khaki, Chocolate and Black, occurring in both field and garden varieties. In addition to these three colours there is a fourth colour, Buff, which has so far been met with in field varieties only. In this Buff, the colour of the seed coat is Buff except at the micropylar zone which is colourless and white.

In each of the three seed colours Khaki, Chocolate and Black, the colour may be present either over the whole of the seed coat or be restricted to portions thereof. The commonest instance of restriction in the manifestation of these colours is in most of the white grains in which the colour is confined to the micropyle, edging the raphe and concentrating again at the caruncle. From the caruncle there is a spur of colour ending in a fork. Near the caruncle there is a small patch of dotted colour on the body of the seed coat. This restriction of colour to the above zone may occur in all the three colours. There are thus three kinds of white grains with the above restricted colour pattern, which for the sake of convenience are designated Micropylar Khaki, Micropylar Chocolate and Micropylar Black. No varieties coloured Khaki, Chocolate or Black have been met with in which the micropyle is white. It may be noted that there is a variety of *lablab*, Burman in origin, which is white and in which there is no micropylar colour, and this type of white is not considered in this article.

In the case of the Buff seed, however, a restriction of colour as explained above has not been met with. We do not therefore have a Micropylar Buff with a white seed coat, similar to those existing in the colours, Khaki, Chocolate and Black. A Buff seed coat colour and an absence of colour at the micropylar zone are the characteristics of this Buff coloured seed.

Each of the whole colours Khaki, Chocolate and Black has proved a simple dominant to Buff. Crosses between Buff and each of these three colours have given first generation plants in which the Buff characteristics were suppressed. In the second generation simple monohybrid ratios were

obtained between the whole colours Khaki, etc., and Buff with its colourless micropyle (Tables I, II and III).

TABLE I. *Buff* × *Khaki* (F_1—*Khaki*).

F_2 Family No.	Khaki	Buff
D. L. 1026 ..	78	21
„ 1027 ..	91	29
„ 1028 ..	70	26
Total	239	76
Expected, 3 : 1 ratio ..	160·5	53·5

The Coloured Plate will appear in the next issue.

TABLE III. *Buff* × *Black* (F_1—*Black*).

F_2 Family No.	Black	Buff
D. L. 789 ..	68	19
„ 791 ..	54	20
„ 799 ..	57	16
„ 802 ..	52	17
Total ..	231	72
Expected, 3 : 1 ratio ..	227·25	75·75

obtained between the whole colours Khaki, etc., and Buff with its colourless micropyle (Tables I, II and III).

TABLE I. *Buff* × *Khaki* (F_1—*Khaki*).

F_2 Family No.	Khaki	Buff
D. L. 1026 ..	78	21
,, 1027 ..	91	29
,, 1028 ..	70	26
Total ..	239	76
Expected, 3 : 1 ratio ..	236·25	78·75

TABLE II. *Buff* × *Chocolate* (F_1—*Chocolate*).

F_2 Family No.	Chocolate	Buff
D. L. 784 ..	100	32
,, 808 ..	64	18
Total ..	164	50
Expected, 3 : 1 ratio ..	160·5	53·5

TABLE III. *Buff* × *Black* (F_1—*Black*).

F_2 Family No.	Black	Buff
D. L. 789 ..	68	19
,, 791 ..	54	20
,, 799 ..	57	16
,, 802 ..	52	17
Total ..	231	72
Expected, 3 : 1 ratio ..	227·25	75·75

A factor designated K exists in all the three colours Khaki, Chocolate and Black and this factor is absent in Buff. This factor K brings about the colour Khaki (the basic colour for Chocolate and Black). Along with the production of Khaki colour, this K colours the micropylar zone.

A second factor Bf is responsible for the presence of colour in the body of the seed coat, barring the micropylar zone. When this is present the colour of the seed coat is Buff. With K this gives the wholeness (Body and Micropyle) to the colours Khaki or Chocolate or Black. A monogenic difference has been found in segregations between whole colour and micropylar colour in the three colours Khaki, Chocolate and Black. The three following tables summarise the experiences met with (Tables IV, V and VI.)

TABLE IV.

Micropylar Khaki × *Khaki* (F_1—*Khaki*).

F_2 Family No.	Khaki	Micropylar Khaki
From D. L. 602 ..	49	15
„ „ 604 ..	49	14
D. L. 862 ..	30	11
„ 865 ..	27	7
Total ..	155	47
Expected, 3 : 1 ratio ..	151·5	50·5

TABLE V.

Micropylar Chocolate × *Chocolate* (F_1—*Chocolate*).

F_2 Family No.	Chocolate	Micropylar Chocolate
From D. L. 603 ..	11	2
„ „ 829 ..	24	14
„ „ 1024 ..	25	6
Total ..	60	22
Expected, 3 : 1 ratio ..	61·5	20·5

TABLE VI. *Micropylar Black* × *Black* (F_1—*Black*).

F_2 Family No.	Black	Micropylar Black
From D. L. 824 ..	22	8
,, ,, 841 ..	14	4
,, ,, 843 ..	26	8
,, ,, 850 ..	58	18
,, ,, 852 ..	28	8
Total ..	148	46
Expected, 3 : 1 ratio ..	145·5	48·5

The two sets of monogenic segregations recorded above of K : k and Bf : bf are simple by themselves. An interesting combination of this experience arises when the Buff with its colourless micropyle is mated with any of the three other colours restricted to the micropyle. The first generation gives a whole colour, Khaki, Chocolate or Black according to the micropyle concerned, but in the second generation the segregation is a 2 : 1 : 1 of K Bf : K bf : k Bf.

Khaki	:	Micropylar Khaki	:	Buff
or Chocolate	:	Micropylar Chocolate	:	Buff
or Black	:	Micropylar Black	:	Buff

The genotype k bf with an all-white seed coat was absent proving that K bf and k Bf are absolutely linked (*vide* Tables VII, VIII and IX).

TABLE VII. *Buff* × *Micropylar Khaki* (F_1—*Khaki*).

F_2 Family No.	Khaki	Micropylar Khaki	Buff
D. L. 113	79	39	32
,, 114	125	55	57
,, 497	29	16	13
,, 498	13	4	6
,, 499	18	6	8
,, 508	69	30	27
,, 509	74	44	51
,, 510	49	34	22
,, 511	53	24	33
,, 545	95	54	43
,, 546	89	43	38
,, 547	80	32	32
,, 548	77	46	37
Total ..	850	427	399
Expected, 2 : 1 : 1 ratio ..	838	419	419

TABLE VIII. *Buff* × *Micropylar Chocolate* (F_1 – *Chocolate*).

F_2 Family No.	Chocolate	Micropylar Chocolate	Buff
D. L. 553	123	57	54
,, 554	94	53	45
,, 555	100	46	49
,, 556	98	53	42
,, 558	110	67	51
,, 559	110	60	54
,, 560	89	39	47
Total ..	724	375	342
Expected, 2 : 1 : 1 ratio ..	720·5	360·25	360·25

TABLE IX. *Buff* × *Micropylar Black* (F_1 – *Black*).

F_2 Family No.	Black	Micropylar Black	Buff
D. L. 483	43	18	17
,, 710	40	19	28
,, 711	20	16	14
,, 717	12	7	7
,, 718	16	9	6
Total ..	131	69	72
Expected, 2 : 1 : 1 ratio ..	136	68	68

A factor Ch with K gives the Chocolate colour and when there is a dihybrid segregation between the seed colours Chocolate, Khaki and Buff the simultaneous segregation for whole colour to micropylar colour is consistent with the genetic hypothesis that K bf and k Bf are absolutely linked and the phenotypes Chocolate, Khaki, Micropylar Chocolate, Micropylar Khaki and Buff are realised in the expected proportions 6 : 2 : 3 : 1 : 4 (Table X).