super-imposed on every other manifestation of purple; only in the case of the Localised Purple its effect is feeble.

Summary. A dominant gene *Vt* found in African varieties colours the ordinary purple in the *Ragi* and makes it appear Violet Purple. *Vt* is a simple dominant to *vt* which is present in all local Indian varieties of *Ragi*. *Vt* could be detected in all grades of Purple, excepting Localised Purple on which its effect is feeble. It could be present in a Green (non-purple pigmented), lacking the factor P. The factor *Vt* is not conducive to economic growth under Indian conditions.

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A HERITABLE CASE OF FEMALE STERILITY IN HERBACEUM COTTON

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A type of female sterility was described in 1934 (Kesava Iyengar, 1934), occurring in a pure strain (No. 1281), of *Gossypium herbaceum, L.* grown at the Agricultural Research Station, Hagari. The inheritance of this phenomenon was pursued during 1934, 1935 and 1936. In this paper are presented the morphology and the inheritance of these sterile plants.

The sterile plant. The sterile plants are perfectly healthy throughout their life history. The size, shape and colour of the leaves are all normal. Differences between the normal and sterile plants can be recognised only from the flower-bud stage onwards. The buds of the latter are distinctly swollen at the base and rounded at the tip, while those of the normal flower are more pointed.

The opening of the corolla is noteworthy. In a normal cotton flower the corolla has a contorted æstivation. The flower buds open normally (under the conditions obtaining at Hagari) at 10 a. m. The petals gradually untwist and liberate their upper margins completely. The flower, on complete opening, presents a campanulate form with the staminal column prominently standing out in the centre. The stigmatic head protrudes through this column. The extent of protrusion of the stigma is a varietal characteristic. In the case of the sterile flowers the opening is modified considerably. As a rule,

the flowers do not open fully and liberate the petals freely. An examination of the petals showed that the margins of the adjoining petals get interlocked with the result that the lower part of the petal has a corrugated appearance and causes the base of the flower to swell. The above feature is perceptible even from the bud stage. The flower on opening has a characteristic appearance.

Actual measurements made to determine if the ratio—breadth of the petal/the length of the petal—is identical in the normal and sterile flowers, show that in the case of the normal flowers the ratio was 0·78 while in the case of the sterile flowers it was 0·96. Thus the sterile flowers have relatively broader petals.

The staminal column in the sterile flower is slightly shorter than that in the normal one, but the number of filaments is greater in the former. The normal flower on an average bears 54 staminal filaments while the sterile flower has 64 filaments. The pollen grains of the sterile flower are viable and readily put forth tubes when dusted on to normal stigmatic faces. The resulting bolls are to all appearances normal and contain viable seeds. Pistils of the sterile plants are remarkable in that they present several abnormalities. In the normal cotton flower all the three regions of the pistil are well developed. But in the sterile plant, the ovary alone is well developed and bears ovules. It is globular in shape. The carpels do not however extend to form a well developed style as in a normal flower. The style is about a tenth of a centimetre while the length of the normal one is 6/10 centimetre. The stigmatic head in the sterile flower is again not well developed with no hairs and secretions. It has three triangular faces and appears to perch almost directly on the ovary, lying completely hidden inside the androœcial column. The result is that no pollen reach it even by chance.

Fresh and viable pollen were dusted on to the stigma of the sterile plant with a view to test its receptivity. The placenta was examined for the pollen tubes by staining with cotton blue in lactic-phenol. No tubes were observed. None of the artificial pollinations made between the normal pollen and the sterile stigma developed any bolls with seeds.

Parthenocarpy: In the sterile plants, some-times well developed bolls were formed. These were whitish in colour instead of being green and flat on the sides. The examination of the boll showed that it was only an enlarged ovary with shrivelled ovules in the locules. These bolls were found to shed after a fortnight.

Inheritance. Natural crosses were spotted in 1933 which were used for the study of inheritance of this character in the seasons 1934—1936. In 1934, 20 plants were selected from a segregating lot and the produce of these plants was sown in 1935. In the segregating families monogenic inheritance was noticed, normal behaving as

dominant. This behaviour was confirmed also by a further study of natural and artificial crosses during the season 1935 and 1936.

Table I

Nature of the cross.	Generation.	No. of families studied.	No. of plants in		Nearest theoretical ratio.	Value of P.
			Normal.	Sterile		
Natural cross.	Probably 2nd	10	1416	435	3 : 1	> ·1
	,,	10	Pure			
	Third.	10	338	101	3 : 1	> ·3
	,,	7	Pure			

Table II

Nature of the cross.	Generation.	No. of families studied.	No. of plants in		Nearest theoretical ratio.	Value of P.
			Normal.	Sterile		
1281	Parent			*		
H. 1	do.		*			
$H_1 \times 1281$	F_1		6	—		
,,	F_2	18	947	309	3 : 1	> ·3
1281 X ($H_1 \times 1281$)	Back cross	5	125	123	1 : 1	> ·5
1281	Parent			*		
1200 A	Do.		*			
1200 A × 1281	F_1		3			
,,	F_2	8	459	173	3 : 1	> ·1
1281 × (1200 A × 1281)	Back cross	3	116	127	1 : 1	> ·3

Artificial crosses. Crosses were made by utilising the pollen of the sterile plants and dusting them on to the emasculated flowers of two pure strains (strains Nos. H. 1 and 1200 A) belonging to the *herbaceum* group, grown on the station during the season 1934. The F_1 plants were all normal in both the sets of crosses and exhibited none of the peculiarities characteristic of the sterile flowers. In 1936, some of the F_1 plants were sown. In all the selections, the segregation was monogenic in both the sets of crosses. (Table No. II).

Back-crosses were made between the F_1 plants and the sterile parent in both sets of crosses, during the season 1935 and the behaviour of their progenies was pursued in 1936. The expected 1 : 1 ratio was obtained. (Table No. II).

Discussion. The behaviour of the segregations in the natural crosses, observed during the two seasons shows, that only one factor is involved in the inheritance of the phenomenon in question. In the artificial crosses, the behaviour of F_1 shows that the normal type is completely dominant to the sterile. The behaviour of the F_2 progenies, and of the back crosses clearly denotes that only one factor

is at play and that the several attendant abnormalities described in the case of the sterile plants are the result of the absence of a single gene. A factor 'Stg' governs the manifestation of the normality of the ovary and its absence (stg) brings about a condition which leads to the sterility of the plant.

Summary.

1. The occurrence of a sterile plant is described.
2. Female sterility is found to be caused by the abnormal development of the style and stigma.
3. Parthenocarpic bolls develop sometimes on the sterile plants.
4. This type of sterility behaves as a simple Mendelian recessive to the normal condition of the flower which is completely dominant.
5. The pair of factors responsible for the above phenomenon are represented by Stg—stg.

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THE PRESENT POSITION OF STRAIN NANDYAL 14 IN THE 'NORTHERNS' AREA.

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The cotton grower is worried. His crop has again fallen below expectation. He got his seed from the best shop in the bazaar. Yet, they say in the market that his stuff is as poor in quality as ever. The buyer does not prize it to his satisfaction. It is annoying in the extreme. He suspects that insects and diseases are partly responsible for his woes. Yet he instinctively feels that in spite of them his crop could do better, but he does not know. Something is wrong somewhere. He goes seeking for advice and happily meets the plant breeder. The breeder understands him and tells him that one reason as he could see from an examination of his crop is that his seed is impure, that is, it is a mixture of several races of cotton. He infuses hope into the dejected grower by saying that the difficulty can be overcome, and that ere long he will be having a crop which will not only be uniform with a fairly steady yield, but will also be valued highly in the market. The breeder sets to work accordingly. He labours for a time and succeeds in discovering what he calls a promising strain—from the local stock. The eager cultivator welcomes it, and is amazed to find it scoring high directly on being put on the market. Buyers rush up to him prefering his produce to others. All goes well with him, and he is carried on the crest of fortune, but only for a while. Soon a tide turns to his vexation. The demand goes down suddenly in the market, and the strain no longer fetches him more money than the original