MODIFIED STIPULES IN GROUNDNUT

GROUNDNUT (*Arachis hypogaea*, L.) leaf has a pair of adnate and sickle shaped stipules with accuminate tips. Reports on variability of stipule character in groundnut are scanty. However, variations in size of stipules are observed[1]. Two mutants having modified stipules were isolated after X-ray treatment. These were inter-crossed and also crossed with others to study the genetics of stipule character. A third variant with modified stipules was isolated in the cross between the two stipule mutants. Studies on the three modified stipule types are reported here.

The darker green mutant[2] has oval shaped leafy stipules on the basal leaves of the seedlings. This modification is referred to as foliaceous stipule. Genetic behavior of the mutant character has been reported elsewhere[3]. Another mutant also having foliaceous stipules (Fig. 1, 6th leaf) was isolated in the variety TG–8[4] after 30 kR X-ray treatment. The modified stipules in this mutant occur on the basal third or fourth leaf only unlike in the darker green mutant. These two mutants are now designated as foliaceous 1 and 2 (fol-1 and -2). Genetic studies of fol-2 showed mongenic inheritance (Table I) unlike the modified dihybrid inheritance[3] of fol-1.

quent generations. Since it differed from both fol-1 and fol-2 mutants, it is called foliaceous-3 (fol-3).

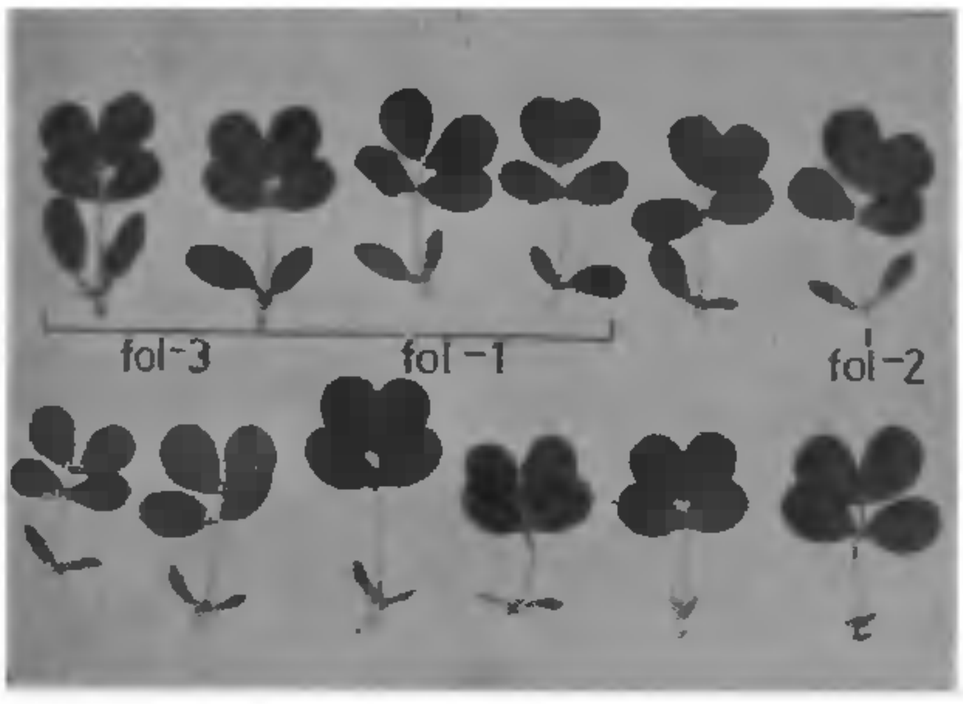

FIG. 1. Stipule variations in a cross, fol-1 × fol-2. Top row: Phenotypes. Bottom row: Developmental variations.

Morphological Characters

Comparative observations on the three foliaceous stipule mutants, *viz.*, fol-1, 2 and 3 as well as the parent variety, Spanish Improved (SP), are summarized in Table II. The plant growth was reduced in fol-1 and

TABLE I

Segregations in F_2 for fol-2

Cross	F_1 plants		F_2 plants		χ^2 (3 : 1)
	Number	Stipule	Normal	Fol-2	
SP × fol-2	5	Normal	187	73	1·21
fol-2 × SP	7	,,	184	57	0·23
TG–17 × fol-2	2	,,	90	30	0·00
fol-2 × TG–17	3	,,	73	33	2·12
Pooled	17	,,	534	193	0·88

A cross between fol-1 and 2 showed paternal inheritance[3] as expected from fol-1 crosses. In the F_2 generation variations in size and shape of the modified stipules were observed (Fig. 1) on the basal leaves of the seedlings. In some seedlings the foliaceous stipules were as large as a leaflet, while in few others they were similar to that of fol-2. The stipule expressions generally varied between these extremes in the remaining seedlings.

In F_3, however, a plant having foliaceous stipules not only on the basal leaves but also on upper leaves was isolated. The progeny of this variant had foliaceous stipules which were also large in size on all the leaves (Fig. 2, fol-3). This bred true in the subse-

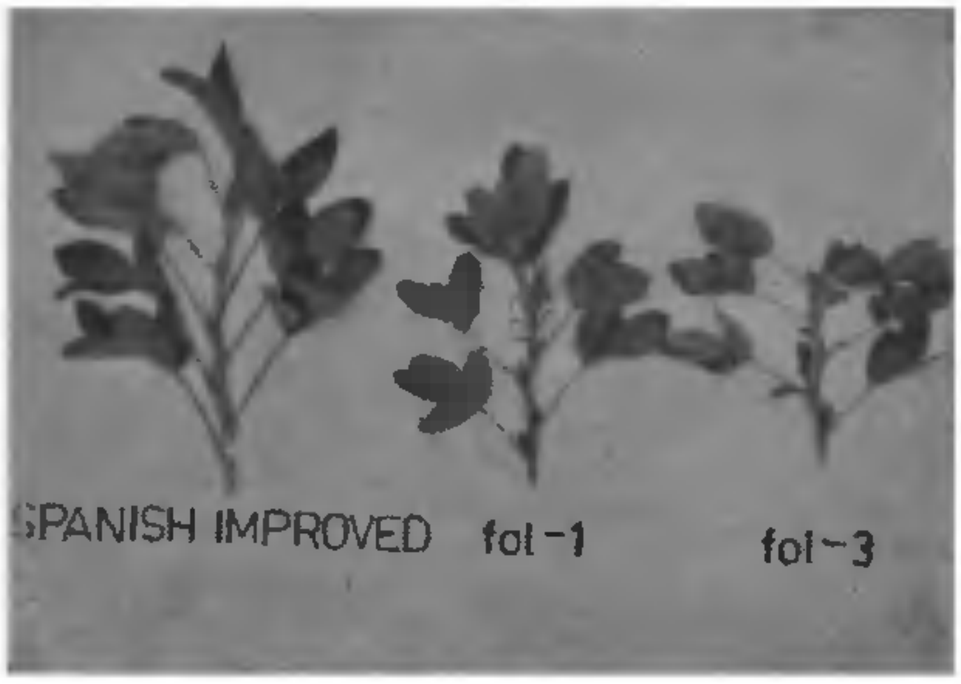

FIG. 2. Top portions of stems.

TABLE II
Comparative characters

Characters	SP	Foliaceous mutants		
		1	2	3
Height (cm)	85±2·12	70±1·8	80·0±2·26	66±1·29
Number of branches (Primary + secondary)	6+8	10+15	4+2	8+12
Leaflet: Size (length × breadth)	6·3 × 3·5	5·2 × 2·5	7·2 × 3·1	5·7 × 2·5
Colour	green	dark green	dark green	dark green
Foliaceous stipule	absent	basal leaves	basal leaf	all leaves
Stipule size at maturity:				
Length (cm)	4·68±·06	5·41±·08	4·66±0·7	6·14±·09
Breadth (cm)	0·80±·01	0·91±·02	0·79±·01	1·10±·02
Pod: Numbers (one + two seeded)	7 + 42	12 + 11	6 + 35	13 + 15
Size	normal	normal	bold	bold
Constriction	normal	shallow	deep	normal
Beak	present	absent	absent	present
100 kernel weight (gm)	52	43	65	60

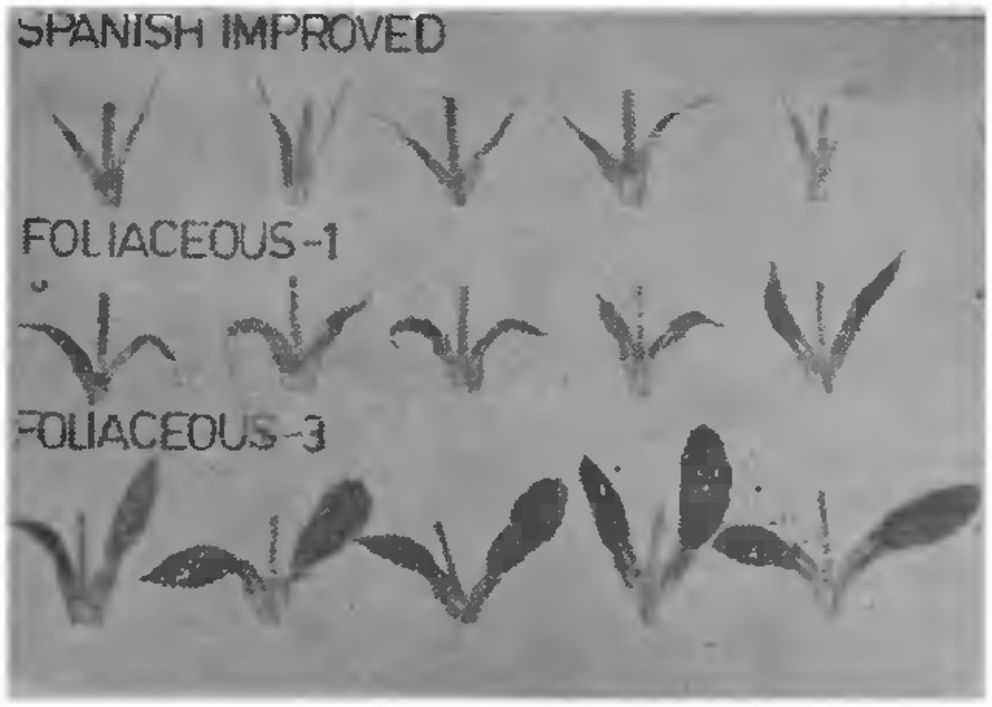

FIG. 3. Stipules on top five leaves at maturity.

3, while in fol-2 it was generally similar to SP. The number of branches in fol-2 was less as in TG–8 parent[4]. The primary and secondary branches in fol-1 and 3 were about 30% more than SP suggesting that fol-3 has inherited the branching habit of fol-1. The leaflets in fol-1 and 3 were uniformly smaller compared to those of SP and fol-2. All the foliaceous mutants had darker green leaves unlike normal green in SP. Pods with one and two kernels were equal in fol-1 and 3, while the pods with two kernels were predominantly more in fol-2 and SP. The size of the pods and kernels in fol-3 were similar to those of fol-2 suggesting that the bold size was contributed by fol-2. The pods of all the three mutants had non-prominent beaks.

Measurements of stipule sizes on the top ten leaves at maturity showed that the stipule size was smallest in fol-2 and resembled that of SP. Fol-3 had the largest stipules and in fol-1 they were intermediate in size (Fig. 3). In addition to large stipules of fol-1 and fol-3, there was a change in the shape showing more curvature of the blades. The size of foliaceous stipules on the basal leaves of these mutants differed in the same way. The foliaceous stipules occurring on third or fourth leaf from the base in fol-2 were smallest, while those appearing on the four basal leaves in fol-1 and 3 were very prominent and occasionally as large as the leaflets (Fig. 1). Although fol-3 resembled fol-1 at seedling stage, it differed by having foliaceous stipules on the upper leaves indicating intensified expression of the mutant character. Since fol-3 was isolated in a cross, fol-1 × fol-2, the intensified expression may be attributed to an interaction resulting from mutant genes contributed by the induced mutants.

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