

INHERITANCE OF SOME INDUCED MUTANT CHARACTERS IN JUTE (*CORCHORUS OLITORIUS* L.)

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ABSTRACT

Induced mutant characters of jute (*Corchorus olitorius* L.) such as, chlorina, virescent, yellow, patchy albino leaf colour; waxy leaf surface, ribbon, cordate, trifid leaf forms; distant and extreme leaf serration; dwarf, stiff, lazy stem, drooping top, bushy stem, white stem; foliaceous stipule; white flower and round pod, were all monogenic recessive in nature. The F₂ generation of their crosses with the genotypes having wild type characters segregated into 3:1 ratio for each mutant characters. Gene symbols for these characters are proposed. No linkage could be detected amongst these mutants.

Key words: *Corchorus olitorius*, mutant, inheritance, gene symbol.

Inheritance of qualitative characters in jute has been studied poorly due to lack of availability of distinct phenotypes. However, in the recent past series of attempts have been made to induce mutation using physical mutagens [1, 2] and many qualitative mutations have been reported [2] but inheritance of some of them has not yet been worked out. This paper reports the inheritance of some of the induced mutations in *Corchorus olitorius*.

MATERIALS AND METHODS

Induced mutations for the following characters were used to investigate their inheritance.

1. Leaf colour: (a) chlorina, (b) virescent, (c) yellow, (d) patchy albino. **2. Leaf surface:** waxy. **3. Leaf shape:** (a) ribbon (leaf blade is extremely reduced), (b) cordate, (c) trifid (leaf blade is trilobate, each lobe with a pointed tip). **4. Leaf serration:** (a) distant serration (as named by Thakare et al. [1] who described it first), (b) extreme serration (margin double serrate, so named by Thakare [1]). **5. Leaf texture:** leathery leaf. **6. Stem:** (a) dwarf (the height reduced to 1/3 or 1/4, internodes highly condensed), (b) stiff stem (does not bend easily,

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breaks under pressure), (c) lazy stem (soft, bend easily on mild pressure, somewhat prostrate), (d) drooping top (tip of stem droops even when fully turgid), (e) bushy stem (almost all axillary buds develop into thin branches, giving bushy appearance), (f) white stem (instead of usual green pigment on bark, white or albino pigment is produced giving white appearance of stem). 7. **Foliaceous stipule** (instead of linear, filamentous stipules larger like rudimentary leaves). 8. **White flower**. 9. **Round pod** (capsules globular).

The above true breeding mutants were crossed with the standard type having wild type allele for the mutant character. The F₂ seeds were obtained by selfing F₁ plants. The F₂ segregations were tested by χ^2 test for 3:1 ratio.

RESULTS AND DISCUSSION

The pooled F₂ segregation data are presented in Tables 1–3. From the tables it will be seen that the above mentioned induced mutant character are monogenic recessive to their

Table 1. F₂ segregation for leaf characters (pooled) in *C. olitorius*

Character	Phenotypes		F ₁ pheno- type	No. of F ₂ families	No. of F ₂ plants			χ^2 (3:1)	P
	normal	mutant			normal	mutant	total		
Leaf colour	Green	Chlorina	Green	7	4338	1370	5708	3.036	0.10–0.05
					Heterogeneity			2.151	0.90–0.75
	Green	Virescent	Green	5	3837	1201	5038	3.623	0.10–0.05
					Heterogeneity			3.117	0.50–0.25
	Green	Yellow	Green	6	3710	1229	4939	0.098	0.90–0.75
					Heterogeneity			1.666	0.90–0.75
	Green	Patchy albino	Green	5	2960	943	3903	0.133	0.75–0.50
					Heterogeneity			11.032	0.03–0.01
Leaf surface	Glabrous	Waxy	Glabrous	7	4056	1316	5372	0.724	0.50–0.25
					Heterogeneity			6.980	0.25–0.10
Leaf shape	Normal	Ribbon	Normal	6	4544	1447	5991	2.242	0.25–0.10
					Heterogeneity			2.925	0.50–0.25
	Lanceolate	Cordate	Lanceolate	5	4287	1445	5732	0.134	0.75–0.50
					Heterogeneity			5.570	0.25–0.10
	Entire	Trifid	Entire	3	1003	309	1312	1.467	0.25–0.10
					Heterogeneity			0.048	0.99
Leaf serration	Normal	Distant	Normal	8	5180	1640	6820	3.252	0.10–0.05
					Heterogeneity			2.661	0.90–0.75
	Normal	Extreme	Normal	6	5445	1737	7182	2.541	0.25–0.10
					Heterogeneity			1.950	0.90–0.75
Leaf texture	Normal	Leathery	Normal	5	3469	1096	4565	2.392	0.25–0.10
					Heterogeneity			1.561	0.75–0.50

Table 2. F₂ segregation of stem and stipule characters (pooled) in *C. olitorius*

Organ	Phenotypes		F ₁ pheno- type	No. of F ₂ families	No. of F ₂ plants			χ^2 (3:1)	P
	normal	mutant			normal	mutant	total		
Stem	Tall	Dwarf	Normal	4	2413	771	3184	1.047	0.50-0.25
						Heterogeneity		1.444	0.90-0.75
	Flexible	Stiff	Flexible	5	3756	1177	4933	3.420	0.10-0.05
						Heterogeneity		1.997	0.75-0.50
	Erect	Lazy	Erect	3	776	333	1109	1.403	0.25-0.10
						Heterogeneity		3.495	0.10-0.05
Stipule	Green	White	Green	6	3321	1033	4354	3.773	0.10-0.05
						Heterogeneity		1.366	0.90-0.75
	Normal	Bushy	Normal	4	1693	583	2276	0.412	0.75-0.50
						Heterogeneity		1.998	0.50-0.25
	Erect top	Drooping top	Erect top	6	5541	1769	7310	2.627	0.25-0.10
						Heterogeneity		3.656	0.50-0.25
Stipule	Filiform	Foliaceous	Filiform	7	4146	1374	5520	0.035	0.90-0.75
						Heterogeneity		7.670	0.25-0.10

corresponding wild types. Data showed good fit to 3:1 ratio in each case. Though some of these mutants have been reported [1, 2] earlier but gene symbols of them were not proposed except for dwarf [2]. Hence, gene symbols for other characters studied in this work are proposed as follows.

Table 3. F₂ segregation of flower and pod characters (pooled) in *C. olitorius*

Organ	Phenotypes		F ₁ pheno- type	No. of F ₂ families	No. of F ₂ plants			χ^2 (3:1)	P
	normal	mutant			normal	mutant	total		
Flower	Yellow	White	Yellow	4	1964	647	2611	0.067	0.90-0.75
						Heterogeneity		2.900	0.25-0.10
Pod	Elongate	Round	Elongate	4	1654	508	2162	3.386	0.10-0.05
						Heterogeneity		0.207	0.95-0.90

1. Green leaf (Cl) : chlorina (cl); 2. green leaf (Vs) : virescent (vs); 3. green leaf (Yl) : yellow (yl); 4. green leaf (Pal) : patchy albino (pal); 5. glabrous leaf surface (Wx) : waxy leaf surface (wx); 6. normal leaf texture (Lt) : leathery leaf (lt); 7. normal leaf form (Rl) : ribbon leaf (rl); 8. lanceolate leaf (Cd) : cordate leaf (cd); 9. entire leaf (Tf) : trifid leaf (tf); 10. normal

serration (Se) : extreme serration (se); 11. normally spaced serration (Sd) : distant serration (sd); 12. flexible stem (Stf) : stiff stem (stf); 13. erect stem (Lz) : lazy stem (lz); 14. green stem (Wst) : white stem (wst); 15. Normally branched stem (Bst) : bushy stem (bst); 16. erect stem top (Std) : drooping stem top (std); 17. filiform stipule (Fls) : foliaceous stipule (fls); 18. yellow flower (Wf) : white flower (wf) and 19. elongate pod (Rp) : round pod (rp).

The digenic segregation ratios of the above mentioned genes were tested for linkage, if any, by linkage χ^2 test. No linkage was detected.

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