

COTTON Innovate



Weekly Newsletter from Central Institute for Cotton Research, Nagpur

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A new Species of Cotton *Gossypium stephensii*

- J H Meshram and Punit Mohan

Cotton plant belongs to the family *Malvaceae* and genus *Gossypium* L., which comprises about 50 species, 45 of which are diploid ($2n=2x=26$) and the remaining 5 being allotetraploid ($2n=4x=52$) and whose geographical distribution spans the tropical and sub-tropical regions of the world (Wendel et al 2009). Most wild cottons are diploid, but a group of five species from America and Pacific islands are tetraploid. A new species of cotton *Gossypium stephensii* (*Malvaceae*) identified from an isolated chain of three islets located in the Western Pacific, Wake Island. Wake Island is one of the most isolated islands in the world and the nearest inhabited Island is Utirik Atoll in the Marshall Islands (near the equator of Pacific Ocean under USA government control). It is included in its endemic flora list is a representative of the genus *Gossypium* colloquially referred to as Wake Island cotton.

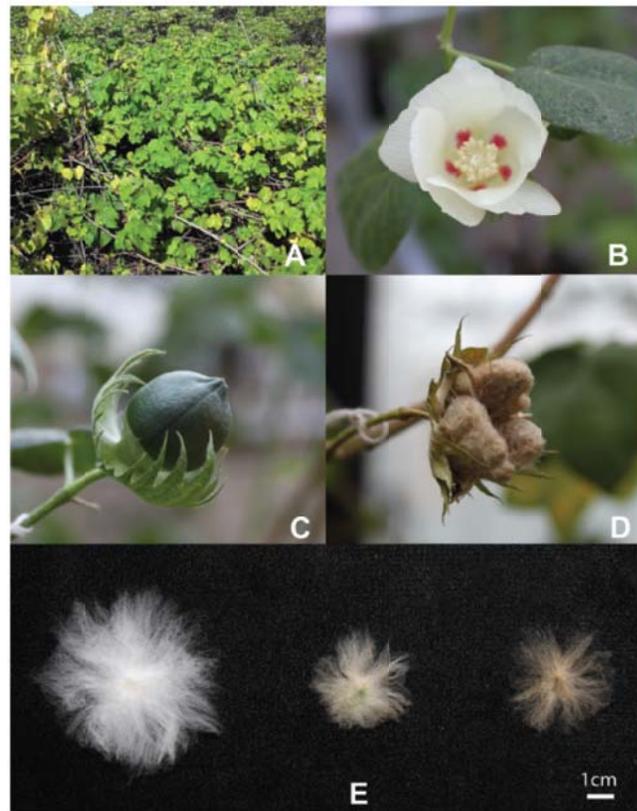


FIG. 5. Illustrative morphological features of *Gossypium stephensii*: A. The spreading growth habit of *G. stephensii* in its native habitat in Wake Atoll. B. Flower. C. Immature capsule. D. Dehiscent capsule and seed, showing light reddish-brown fibers. E. Comparison of seed fibers from *G. hirsutum* cv. Massa, a domesticated line of Upland cotton (left), *G. stephensii* (center), and *G. hirsutum* TX2094, a wild form of *G. hirsutum* var. *peruvianum* (right).

Source: Gallagher et al., 2017

Stanley G. Stephens pointed out that “Wake Island cotton does not resemble closely either the Caribbean or other Pacific forms.” Taking into consideration morphological distinctions, the geographic isolation of Wake Atoll, and newly generated molecular data concluded that the cottons of Wake Atoll in fact represent a new species of *Gossypium*, named *Gossypium stephensii*. This name is chosen to commemorate the eminent natural historian, evolutionary geneticist, and cotton biologist, S. G. Stephens. Wake Island cotton is a wild form of *G. hirsutum* “sprawling shrub”

growth habit, “densely hairy” pubescence, and larger than average petal spot in comparison to the other Pacific cottons. *Gossypium stephensii* is found exclusively on the islets that make up Wake Atoll. Wake Atoll has a tropical maritime climate and is subject to trade winds and occasional typhoons. *G. stephensii* differs from *G. ekmanianum* (tetraploid) in having dense leaf pubescence, 8–11 bracteal teeth, sub-globose capsules, and 3–4 locules in the capsule. Although many characteristics of *G. stephensii* overlap with the species concept of *G. hirsutum*, it differs from *G. hirsutum* in lacking extrafloral nectaries at anthesis; these appear during capsule development. *G. stephensii* clade is phylogenetically sister to the *G. ekmanianum* clade.

Upland cotton (*Gossypium hirsutum* L.) which produces more than 95 % of the world natural cotton fibers has narrow genetic base which hinders progress in cotton breeding. Introducing germplasm from exotic sources from another tetraploid can broaden the genetic base of upland cotton. The newly identified species of *Gossypium* viz., *G. stephensii* have evolved in region where tropical maritime climate is prevalent and may have source for salinity and water logging tolerance in cotton.

Table 1. Species diagnostic traits for *G. stephensii* and its most closely related species, *G. hirsutum* L. (based on Fryxell 1992) and *G. ekmanianum* Wittm. (based on Krapovickas and Seijo 2008).

Feature	<i>G. stephensii</i>	<i>G. hirsutum</i>	<i>G. ekmanianum</i>
Growth habit	Sprawling shrub	Wide branching shrub	Sprawling shrub
Leaf pubescence	Dense	Dense to glabrous	Scattered
Floral nectaries	Absent	Present	Present
Bracteal Teeth	8–11	3–19	3–9
Petal size	40 mm	20–50 mm	40 mm
Capsule shape	Subglobose	Broadly ovoid to subglobose	Broadly ovoid
Number of locules	3–4	3–5	3
Locality	Wake Atoll	Caribbean, Central America, South Pacific	Dominican Republic

Suggested readings:

1. Gallagher J.P, Grover C.E, Rex K, Moran M, Wendel J.F (2017). A New Species of Cotton from Wake Atoll, *Gossypium stephensii* (Malvaceae), *Systematic Botany*, 42(1):115–123.
2. Wendel, J.F., C.L. Brubaker, J.P. Alvarez, R.C. Cronn, and J.M. Stewart. (2009). Evolution and natural history of the cotton genus. In: A.H. Paterson, editor, *Genetics and genomics of cotton*. Springer, New York. p. 3–22.

Meeting for finalization of multiplication of released Bt cotton variety CICR RS 2013 Bt

Dr D Monga Head, CICR Regional Station, Sirsa and Dr O P Tuteja participated in the Meeting for finalization of multiplication of released Bt cotton variety CICR RS 2013 Bt at CICR Nagpur on 12th June. The meeting was held under the chairmanship of Director CICR Nagpur.

3rd Meeting of Interstate Consultative Committee on Whitefly at Abohar

Dr Rishi Kumar, Principal Scientist (Entomology) attended the 3rd Interstate Consultative Committee meeting on whitefly management held at CIPHET, Abohar under the chairmanship of Dr B. S. Dhillon, Vice Chancellor, PAU, Ludhiana. Dr N. S. Bains, Director of Research, Dr R. S. Sidhu, Director of Extension Education, PAU, Ludhiana, Dr Sukhdev Singh, JDA Cotton, Punjab, Dr Karmal Singh, Scientist Cotton, Dr. R. Chugh, Plant Pathologist Cotton Section, Dr Ram Pratapsihag, JDA, Cotton (Hry), Dr Babulal, DDA Sirsa, Dr Balwant Sharan, DDA Fatehabad and Dr. Roop Singh Meena, ARS Gangangar attended the meeting. Chief Agriculture Officers of all 8 cotton growing Districts of Punjab presented information regarding survey and surveillance and other activities conducted in Punjab. Dr Rishi Kumar presented the survey and surveillance report of entire zone with respect to whitefly.

Superannuation

Shri. Manohar Kamble, SSS superannuated on 30th June, 2017 from the service of ICAR-CICR on the completion of 60 years age. A farewell function was organised on June 30, 2017 in this regard. CICR wishes him a happy retired life.



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