

REVIEW

I

W. Wouters — Contribution a l'étude Taxonomique et Caryologique du Genre *Gossypium* et application a l'amélioration du cotonnier au Congo Belge. Contributions to the taxonomic and karyological studies of the genus *Gossypium* and its application in the improvement of the cotton plant in Belgian Congo; Taxonomy of the cotton; study of the species indigenous to Belgian Congo and the cytology and phylogeny of *G. arboreum* L. and *G. hirsutum* Mill.) *Publications de l'Institut National pour l'Etude Agronomique du Congo Belge. Serie Scient.* No. 34; 1948, pp. 383; bibl. with 5 plates and many figures. The work has been dealt with in three parts viz. Part I the revision of the systematics of the cottons, Part II. the study of the cotton species indigenous to Belgian Congo and Part III. Contributions to the phylogeny of the cottons—Section Neo*Gossypium* (the tetraploid cottons.) The stages in the evolution of the different systems of classification from the time of Linnaeus 1753 to that of Hutchinson 1939 and Konstantinov 1939 has been traced. The author has critically examined the comparative merits and demerits of the different morphological characters employed in the classification of cottons. An interphyletic comparison of the genus *Gossypium* has been done and a hypothetical phyletic relationship arrived at. A chapter has been devoted to the discussion on the geographical distribution of the genus *Gossypium*. The second part is devoted entirely to the consideration of the cottons of Belgian Congo indigenous as well as wild species treated under:—

A. Cottons indigenous, diploid and Asiatico-African in origin,

B. Cottons American, tetraploid and American in origin.

The species that have been considered as truly indigenous and definitely of African origin are A. exclusively wild —

1. *Cienfuegosia triphylla* (Harv). Hoch.,
2. *Gossypium anomalum* Wavra et Peyr.,
3. *G. Kirkii* M. Mast. (*Kokia Kirkii* Skovsted).

B. cultivated —

4. *G. herbaceum* var. *acerifolium* subvar. *africanum* and
5. *G. herbaceum* var. *aceriflorum* subvar. *Wightianum*.

There are altogether 17 species cultivated and wild met with in Belgian Congo. Some of the wild species possess remarkable fibre lengths and rugosity even in unselected plants. (Staple length 27 to 28 mm). These useful species are under danger of extermination due to their being uncared for by the natives and the systematic destruction by the colonial agents. The introduction of the American cottons has taken

place along
West to Ea
through the
the Belgia
American
Belgian Co

The
and adapte
to 16" lo
precacious
followed
pleads th
properly
and at th
duration)
such case
should b
and in
synthesis
the Upl
indispen
program
types o
breeding
species.
sympod
importa
crosses
species

works
colchic
were
done i
40% c
hours
detail
length
eviden
the 2
is n
chro
the
origi

place along two converging but opposite direction, the older one from West to East, through the Atlantic ocean and the other more recent through the Pacific and Indian ocean. All the wild cotton plants of the Belgian Congo belong to three — different though related — South American groups. The North American group is not represented in the Belgian Congo among the wild species.

The majority of the wild cotton plants have qualities of resistance and adaptability, the fibre is rough and in some of an excellent quality, 1 to 16" long. These allow of selection and isolation of sympodial and precocious types. The author recommends the back-cross technique to be followed in the improvement and introduction of useful characters. He pleads that these valuable wild species with their varieties should be properly preserved. The difficulty of combining the useful characters and at the same time preserving the precocity of the hybrids (seven months duration) owing to probable unfavourable linkage groups is realised. In such cases the hybrids would for the present not be useful; and one's efforts should be turned towards the production of an artificial Upland species and in increasing its variability. That objective may be attained by synthesising by paraphyletic processes of a plant as similar as possible to the Upland species. For this a more precise phylogenetic data is indispensable. In breeding cottons for Congo the immediate and future programmes should be: (a) of first importance is to improve the Upland types of Congo (Triumph and U. 4.) by pedigree method and cross-breeding and the same time maintaining the variability of the Upland species. The study of the wild plants on a small scale and selection of sympodial and monopodial types should proceed on. (b) of second importance is the thorough selection of the types resulting from the back-crosses. (c) of next importance the creation of a more variable Upland species capable of producing types well adapted to the Congo.

In the third part the author critically reviews the earlier cytological works upto 1941, including the several interspecific hybrids, polyploids colchicine induced as well as spontaneous. The root tips for somatic study were obtained by germinating the seeds in petri dishes. Fixations were done in Navashin's fluid as modified by Dustin (1% charomic acid-75 parts; 40% comm. formaldehyde 20 parts; Glacial acetic acid 5 parts.) for 24 hours duration and stained in Haidenpeins Ironalum-Haematoxyline. A detailed account of the method employed in measuring the chromosomal lengths is given. The author finds that in *G. arboreum*, no corroborative evidence could be found to support the theory of secondary polyploidy of the $2n=26$ species. In *G. hirsutum* Mill. the autopolyploidy of the species is more probable but taking into account the variability in the chromosomes and errors in measurements the accuracy could be only of the order of 36%. The author supports the view that this species originated as an allopolyploid.

Morphologically, half of its chromosomes easily allow themselves to be homologated with the chromosomes of an Asiatic plant; the other half made of small chromosomes, would correspond to a yet unknown parent.

The macromorphological equivalence between the cultivated American plants and the cultivated asiatic ones, is undeniable. The morphological equivalence seems to us very high for half of the set; and as other authors have proved the *intrinsic* chromosomal equivalence (by meiotic connection among hybrids in between these two groups). *The author feels that the hypothesis that an Asiatic plant (*G. herbaceum* L. or some other near species perhaps extinct) must be one of the two parental species of the allotetraploid species of *G. Hirsutum* as perfectly justified.*

The divergences among authors may be explained by the sole chromosomal variability. A supplementary cause of error resides in the difficulty of bringing into evidence the point of insertion, which entails all the dangers of a subjective interpretation.

Satellites.— It seems premature to think of the interference in phylogeny of the number and morphology of those particularities, before their nature and behaviour have been clearly established.

Cytology :

1. *The chromosomes of Gossypium*, even as to their relative length with regard to each other (or idiogram) are not constant. They present on the contrary, a variability which can be figured out, and which has to be taken into account when comparing idiograms with each other.
2. *Satellites*: With the Cotton plant no question would arise about the organites attached to the chromosomes by a filament and capable of showing or otherwise according as they are stained or not. There would rather be a question of stained extremities of chromosomes, preceded by a zone which can appear achromatic in conditions not yet defined. If the zone appears achromatic, it determines a chromosome apparently accompanied by a satellite; if it remains stained during the differentiation, the chromosome will appear as an ordinary chromosome of the same length as the satellite chromosome — including both satellite and achromatic zone.
3. The various fixation agents produce on the chromosome variable morphological modifications, hence we cannot compare nuclear contents which have not been fixed in identical conditions.
4. The subjective factor plays unhappily an important role in cytological observation, which it is sometimes possible to reduce, but always impossible to completely suppress. It seems therefore desirable: (a) to give as far as possible the preference to permanent preparations which alone allow to re-examine the interpretations a few weeks after the observation; (b) to number the preparations, drawings of which together

with observation accounts are consigned in publications; and to deposit them in a scientific Institution where they can be consulted, as a material for comparison, by the specialists.

That method, the most useful in Systematic Botany and in Entomology, would probably be most useful in cytological research. It would allow to show that the majority of the divergences and theoretical controversies, based on personal observations and experiments made separately, result in most cases from differences of interpretation.

— REV. FR. LEEPEN, Kodaikanal.

II

CYTOGENETICS AND PLANT-BREEDING: By S. N. Chandrasekharan, M. A., and S. V. Parthasarathi, B. Sc. (Ag.) M. Sc., with a forward by K. Ramiah, L. M. Sc., Dip. Agri. (Cantab.), M. B. E., F. N. I., F. A. Sc., Published by Varadachary, 1948. Price Rs. 12—8—0.

The present century has witnessed the rapid advance of the science of genetics and its application to plant-breeding. In India a considerable volume of useful work in this field has been done, but the record of this work lie scattered in several publications, or unpublished reports, which are not readily accessible to the students and teachers of biology at our colleges.

Genetics and plant-breeding form an important part of the syllabus in the Agricultural Colleges and the lack of suitable text books on the subject dealing with Indian crop plants has been felt both by students and teachers.

"Cytogenetics and plant-breeding" by S. N. Chandrasekharan and S. V. Parthasarathi is an attempt to satisfy this need, and the authors deserve much praise for making this pioneer attempt and succeeding in bringing out a good text book on a very difficult subject.

They have taken great pains over the book, and have brought within its compass a large mass of relevant and useful information relating to Indian crop plants and the text is illustrated with a number of photographs and diagrams.

The matter is clearly presented in a readable form and the beginner or layman would find no difficulty in following the book and acquiring a basic knowledge of the fundamentals of the science of crop improvement.

The few chapters in the end of the book are devoted to 'statistics in relation to plant-breeding', and to explaining the technique of laying out field trials for the benefit of beginners.

The book is a useful addition to the few good text books on biological sciences published in India.