STUDIES IN THE ANATOMY OF SUGARCANE STALK

III. Fission and Pseudo-Fission


(Central Sugarcane Research Station, Pusa, Bihar)

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I. INTRODUCTION

While harvesting B. O. 17 (a variety bred at the Station) the authors came across an abnormal case of bifurcation of stalk in which the two arms, after having grown independently for some distance, appeared to have coalesced to form a single stalk again.

Normally once a fission had taken place, the two resulting stems maintained their separate existence to the end.

With a view to study this abnormal case, search for normally bifurcated stalks yielded one stalk of Co 213 and two of Saraitha, a variety of indigenous canes of the province, belonging to the group of the same name.

All the four stalks were described in detail both from morphological and anatomical points of view, and an effort was made to explain the phenomenon.

II. MATERIAL AND METHODS

The four stalks were numbered as follows:

B.O. 17 .. I
Co 213 .. II
Saraitha .. III and IV (Plate III).

The internodes were counted upwards and downwards respectively as +1, +2 and so on, and -1, -2 from the node above which the two arms existed as independent entities and which was, therefore, designated as Node 0. The nodes were similarly numbered as +i, +ii and so on upwards and -i, -ii .... downwards from Node 0. The two halves or arms of a stalk to the left and right of the median diameter* were respectively known as A and B. In the following account the number of a stalk is

* A stalk of sugarcane has two principal diameters, namely, (i) the median passing from front to back through the bud and (ii) the lateral from side to side at right angles to the median. If median diameter is greater than the lateral, the cross-section is said to be oval; if reverse is the case, it is known as flattened.
followed by that of an internode or a node; thus I/ + 2B would mean second internode of the right arm above Node 0 of stalk I. After morphological description of the stalks, their hand sections were taken from different internodes and at different levels of the same internode when necessary, were stained with 1% solution of safranin in 50% of alcohol, and mounted permanently.

III. Morphology

(a) Normal fission.—The two stalks of *Saraitha* were similar in that they did not bear within three or four internodes any outward indication of the agency causing the fission, and that the resultant arms of the fork were more or less equal in length and girth at least for a couple of internodes above the node 0 where actual rupture had taken place. In both the cases the process of splitting was slow and spread over 2-3 internodes below the node 0.

III/ — 4 had no signs of the oncoming split, as it was more or less circular in cross-section having only one bud groove and a cavity in the centre. At III/ — iii there appeared three buds of which the central one was much smaller than those, situated laterally and more or less equal in size. The left bud had a distinct furrow above it while there was no indication of a bud groove on the right, the central bud being too small to have any groove. III/ — 3 was somewhat flattened in cross-section, but the cavity inside maintained its central position. At III/ — ii there were two buds more or less equal in size but only the right one had a bud groove. III/ — 2 above it showed further flattening and the central cavity was pushed to the right and a small cavity was found to develop slowly in the left portion. Still there was no indication of any fissure on the surface. On III/ — i however, the buds were situated on either side of a cleft, and had their own grooves. III/ — 1 showed well developed fissures at both the ends of the median diameter and the cavities inside were more or less equally well formed in both the portions (Plate IV, Fig. 1) but it was enclosed by a single leafsheath. At III/0 bifurcation was over and the two resultant arms were complete in all details and grew independently of each other to the end. The nodes and internodes henceforward were encased in distinct leaf-sheaths without any organic connection between them, and were smoothly reniform in outline for some distance. In the case of IV, the process of splitting was more or less the same except that it was shortened by one internode and that there was some modification of details. IV/ — 3 and IV/ — ii were normal in all respects while IV/ — 2 had a shallow depression on the side of the bud and was somewhat flattened on the other side. The main cavity was pushed to one side and another, smaller in size, was making its appearance.