

**Sterility of the Female Gametophyte of
Colocasia antiquorum, Schott.**

Colocasia antiquorum is a common aroid of Bengal which grows profusely during the monsoon. It is particularly abundant on the sides of tanks and 'jhils' and also on water-logged areas. The method of propagation is chiefly vegetative. As seed formation in this plant has not been observed under natural conditions, a study of the female gametophyte was undertaken which revealed the following facts:

The archesporial cell is hypodermal in origin and functions as the megaspore mother cell. The prophase changes in the nucleus of the megaspore mother cell are quite normal. During the heterotypic metaphase a bipolar spindle is formed, but the chromosomes lie irregularly clumped in the centre and their distribution to the poles is very irregular, as shown in the accompanying photomicrograph.



Heterotypic division of the megaspore mother cell.
× 1100

Degeneration of the megaspore mother cells is first noticed at this stage. Those which do not degenerate undergo the homeotypic division, which is characterised by the same irregularities as was observed during the reduction division. The homeotypic spindles are separated by a distinct wall. Degeneration at this stage is also sometimes observed. As a result of the homeotypic division four macrospores are produced which are arranged lineally and separated by distinct walls. Degeneration of all the macrospores at this stage in the development of the ovule is very commonly met with. The degenerated macrospores appear as dark streaks in the centre of the nucellus. Sections of fully opened flowers and flowers still older invariably show

crumpling of the ovules and the absence of the female gametophyte in the nucellus, which is composed of a few layers of cells and is bounded by the integuments.

It is interesting to note that recently Maeda¹ has observed irregularities in the reduction division of this plant and he believes that probably this might be the cause of sterility. A full account of the investigation will be published elsewhere.

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Loss of Nitrogen from Swamp Soils.

FOLLOWING the classical researches of Gayon and Dupetit on denitrification in sewage, a number of workers have suggested the possibility of similar changes occurring under the 'anaerobic' conditions prevalent in swamp soils. There is very little experimental evidence, however, to support such a theory: nor is denitrification, as commonly understood, likely to play any important part in swamp soils because the latter seldom contain more than traces of nitrates.

In the course of an investigation on carbon and nitrogen transformations attendant on the application of substances with different C-N ratios to swamp soils, it was observed that there was practically no loss of nitrogen during the initial stages of fermentation. There was, on the other hand, considerable production of ammonia especially from substances with narrow C-N ratios. This was followed by a period of slow nitrification when considerable loss of total nitrogen was noticed. The last observation being contrary to the previous conceptions, a series of systematic studies were carried out, following the changes in different forms of nitrogen at weekly intervals.

It was observed that (a) ammonia was generally produced at a faster rate than nitrate, so that fairly large quantities of the former tended to accumulate in the medium (Fig. I), (b) loss of total nitrogen proceeded simultaneously with the mineralisation of nitrogen, and (c) ammonia was the chief nitrogenous product among the gases evolved and accounted for the major part of the

¹ Maeda Yosinori, *Proc. Crop. Sc. Soc.*, 4, 1932 (Abstract from *Jap. Jr. Bot.*, 1933, 4, 3, Abst. No. 258).

nitrogen lost from the soil system (Fig. II). Further study of the conditions relating to the loss of ammonia showed that the soil reaction which had become fairly acid (P_H 5.3) and contained useful amounts of free organic acids (chiefly lactic and acetic) tended to revert to that of the original soil (P_H 7.6) in the later stages. The change in reaction combined with the increasing concentration of ammonia would appear to have facilitated the volatilisation of the latter.

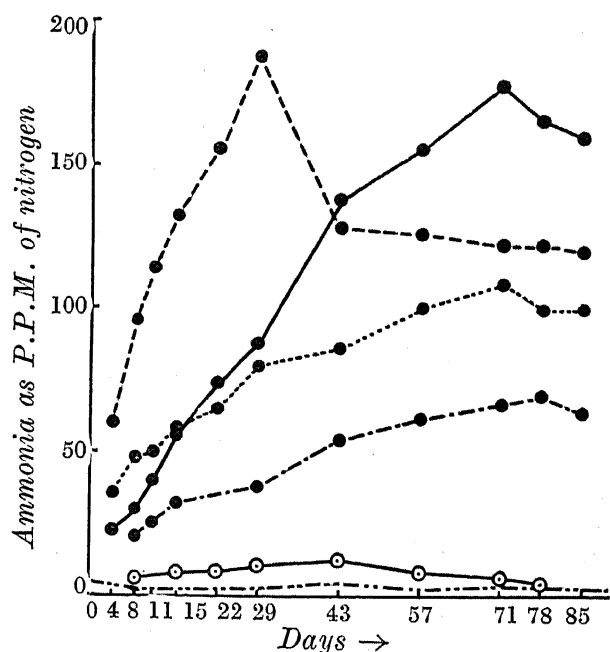


Fig. I.

Production of ammonia from equivalent amounts (in terms of nitrogen) of substances with different C-N ratios.

- Cyanamide ($\frac{C}{N}=0.9$)
- Dried blood ($\frac{C}{N}=3.3$)
- Urea ($\frac{C}{N}=0.4$)
- Hongay leaf ($\frac{C}{N}=13.8$)
- Farmyard manure ($\frac{C}{N}=9.2$)
- - - Control (untreated) ($\frac{C}{N}=10.0$)

Parallel studies conducted under dry soil conditions showed that similar loss by volatilisation of ammonia also occurred in such cases (Fig. II). The quantities thus lost were, however, generally less than those observed under swamp soil conditions.

Further work is in progress to determine the extent to which loss of ammonia by volatilisation occurs in presence of the growing plant. Attempts are also being made to standardise the conditions for the addition of different organic manures so

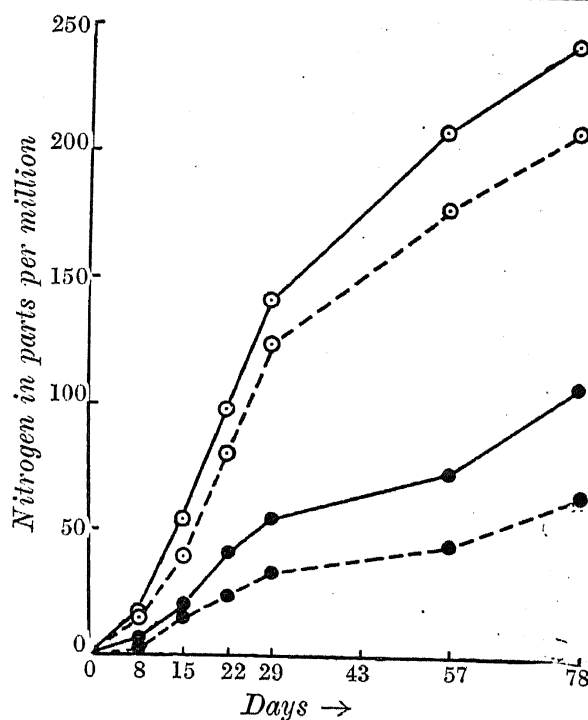


Fig. II.

Loss of total nitrogen and volatilisation of ammonia.

- Total nitrogen lost under dry soil conditions
- " " " " swamp " "
- Ammonia (as nitrogen) lost under dry soil conditions
- " " " " swamp " "

that while mineralisation of nitrogen proceeds unhampered, the resulting products would be retained in the soil system and become available when required by the growing plant.

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Absorption Spectrum of SCl_2 .

THE absorption spectrum of SCl_2 vapour has been studied under different conditions. It shows at first a continuous absorption in the violet region at about 4100 A.U. Between 3400 and 2750 A.U. a well-developed band system appears and then two more continuous absorption regions between 2600 and 2400 A.U. and from 2280 till the limit of the transmissivity of the quartz apparatus have been observed. The spectrum and also the process of primary dissociation