an extremely small apex. Philipson[2] and Popham and Chan[3] have also related the presence of this zone to the early and mid-phases of the plastochron and, certainly, in the *Arabidopsis* apex the zone is best marked in the early phase of the plastochron. The development of this zone at the time stated in the growth processes of the apex is to be expected, for its real importance is to produce cells of the future pith of the axis to accompany the developing leaf and the tissues on which the leaf is laid down.

I am indebted to Prof. F. G. Gregory and Mr. G. Hussey for the plant material on which these observations were made.

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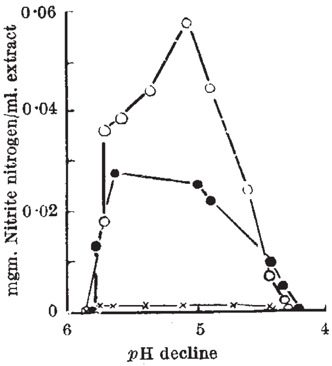
Decomposition of Nitrate in Mixtures of Minced Grass and Water

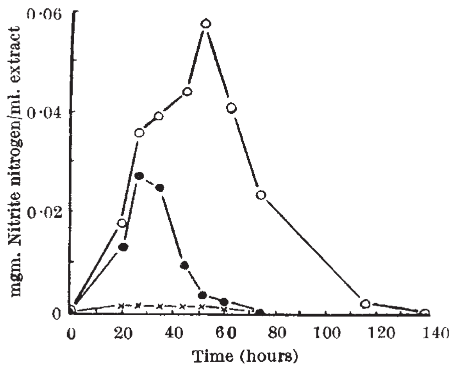
THE addition of various substances, such as amino-acids, has a temporary inhibitory effect on the formation of lactic acid in slurries made from minced grass and water[1]. Among the substances tested in this connexion was potassium nitrate, and it was found, in preliminary tests, that the inhibition was due to the partial formation of nitrite from the nitrate, the former then being decomposed to nitric oxide. The reaction nitrate → nitrite only inhibits the formation of lactic acid temporarily, and when the lactic fermentation reaches a reasonable level, as measured by the fall in *p*H of the mixtures, the second reaction nitrite → nitric oxide takes place.

Unfortunately, it is not possible to measure the lactic acid or lactate content directly by the normal method used[2], because the presence of nitrate or nitrite interferes with the course of the reaction involved[3]. At the same time, as all our studies in this laboratory have shown that in these fermentations the *p*H is extremely closely related to the formation of lactic acid, it is reasonable to conclude that when the *p*H of the mixture to which nitrate has been added attains a level similar to that of the control, the lactic acid plus lactate contents of both are the same. It has been found that this similar level is reached after all the limiting amount of nitrate has been decomposed.



○—○—, Aerated mixture ; ●—●—, anaerobic mixture; ×—×—, anaerobic control

Fig. 1. Formation and decomposition of nitrite from nitrate in minced grass/water mixtures at room temperature under aerobic and anaerobic conditions, showing the corresponding fall in *p*H of the mixtures



○—○—, Aerated mixture ; ●—●—, anaerobic mixture ; ×—×—, anaerobic control

Fig. 2. Results shown in Fig. 1 plotted against time

There are many micro-organisms which could bring about the reaction nitrate → nitrite, and an effort is being made to isolate the one responsible in the experimental conditions involved. At the moment, it appears to have the characteristics of a facultative aerobe, as the reaction proceeds under anaerobic conditions but not to as marked an extent as in aerated mixtures. In Fig. 1 are shown the results obtained by the addition of 5 gm. of potassium nitrate to each of two mixtures, one of which was aerated and the other kept under anaerobic conditions by passing in a continuous brisk current of oxygen-free nitrogen. It will be seen that the reaction starts at about the same point in each case, reaches a much higher peak in the aerated mixture and that, after the decomposition of the nitrite, approximately the same *p*H is reached in each case. Fig. 2 shows the formation and decomposition of nitrite plotted against time. It has been found that the amount of nitrate decomposed in an aerated slurry may be as much as 26 per cent, but only about half that amount is reduced under anaerobic conditions.

The reaction is of interest in view of the findings of Seekles and Sjollema[4] and Bradley *et al.*[5] among others, who have worked on nitrite poisoning in ruminants—a disease sometimes called 'oat-hay poisoning'. Olson and Moxon[6] have found, working with oat hay and red-root, that the reduction of nitrate to nitrite can take place *in vitro* when the material is wet, and these latter workers consider that the reduction may be due to the activity of *Brucellus subtilis*.

A full account of this work will appear elsewhere.

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