(Fig.). This method has several advantages over the usual method of providing spiked plants in pots which do not survive the feeding by insects. The diseased branch, on the other hand, being a part of the big plant, is capable of withstanding the attack of the vectors more successfully than the small independent plant with an equivalent amount of branch and foliage. Often, it is advantageous to decapitate the other branches and divert the entire nutriment available, for the vigorous growth of the diseased branch utilised for the experiment. This device has successfully solved the problem of the supply of spiked plants for our transmission experiments and it is hoped that this method may find useful application in the investigation of the other allied diseases.

M. SREENIVASAYA.
S. RANGASWAMI.

Department of Biochemistry,
Indian Institute of Science,
Bangalore,
August 5, 1935.

Oxidative Digestion of Organic Nitrogen.

IT was shown in a previous communication[1] that nitrogen in soils and biological materials can be estimated by a process of oxidative digestion. The present note relates to (*a*) the nature of the products formed under such conditions and (*b*) an improved procedure for their inclusion in the estimate of total nitrogen.

The observations may be summarised as follows :—(1) When an aqueous suspension (or solution) of soil or other biological material is heated slowly with dichromate (or chromic anhydride) and sulphuric acid as in the usual procedure for the wet combustion of carbon, there is invariably some loss of nitrogen, the extent of such loss being inversely related to the rate of heating. The mechanism of this loss is still not clear though there is some evidence to show that ammonium dichromate, which is formed as an intermediate product, may undergo slight decomposition, yielding elemental nitrogen. The loss can be avoided, however, by first heating the material to be digested with water and sulphuric acid and then adding the oxidising agent to the boiling (or nearly boiling) mixture. (2) Small quantities of nitric acid are formed during the digestion. This is supported by the independent observations of Narasimhacharya.[2] The quantities are ordinarily too small to appreciably affect the estimate of total nitrogen even if the digest is boiled without condensing the ensuing vapours. On the other hand, the original material itself may contain useful amounts of nitrate which may be lost if proper precautions are not taken. The use of water or air-cooled condenser, as suggested by Narayanayya and Subrahmanyan (*loc. cit.*) helps to retain all the nitrogen in this form. Subsequent reduction of the digest with zinc or reduced iron in acid medium or Devarda's alloy in alkaline medium helps to include all the nitrate in the estimate of total nitrogen. More recently evidence has been adduced to show that even added nitrates can be retained in the digest and accurately estimated by adopting the above procedure. (3) It has already been shown (Narayanayya and Subrahmanyan, *loc. cit.*) that a part of the nitrogen is always retained in the digest and is not released by mere distillation with alkali. Further evidence has been obtained to show that the major part of this nitrogen is present in combination with the chromium in solution and is released on treating the digest with such reagents as are usually employed for reducing dichromate. The nature of the related compound (or compounds) is still obscure. (4) No information is available regarding the mode of association between nitrogen and the insoluble precipitate formed—especially in the case of soil—during digestion. It may nevertheless be mentioned that any nitrogen which may be present in that form is also included in the estimate of total nitrogen by treatment with reducing agents followed by distillation with alkali.

It was suggested by Narayanayya and Subrahmanyan (*loc. cit.*) that the total nitrogen in the digest can be estimated by boiling with zinc followed by distillation with excess of alkali. Unfortunately, all preparations of zinc (including some of the purest specimens) contain nitrogen. In some cases, the nitrogen content may be as high as that of the material to be digested. Reduced iron also contains nitrogen, though the latter is partly removed by pre-treatment with alkali. Since the major part of the zinc or iron is required for the reduction of unused chromic acid, it was considered desirable to use other reducing agents for that purpose. Among the various re-agents

that were tried, alkali sulphites were found to be the most effective.

Based on the foregoing and other observations, an improved method of oxidative digestion has been developed and will be described elsewhere.

C. R. HARIHARA IYER.
R. RAJAGOPALAN.
V. SUBRAHMANYAN.

Department of Biochemistry,
Indian Institute of Science,
Bangalore,
August, 1935.

[1] Narayanayya and Subrahmanyan, *Curr. Sci.*, 1935, **3**.
[2] Narasimhacharya, *J.S.C.I.*, 1935, **54**, 596 (Abstract).

Injurious After-Effects of Sorghum Growing.

WHILE working at the problem of the injurious after-effects of Sorghum in the black soil tracts of the Tinnevelly District, it was observed that, after Sorghum, the soils became much more compact and much harder than after the Spiked Millet and that their permeability was considerably reduced.

When examined in the laboratory, certain striking differences were observed in the cationic composition of these soils the results of which are given below.

It will be seen that—

(i) the exchangeable soda of the soil is greater when cropped with Sorghum than when cropped with Spiked Millet and

Exchangeable Bases in Milliequivalents per 100 gm. of Air-Dry Soil.

Head of analysis	Soil depths	Cholam*	Cumbu*	Cholam†		
				Before Sowing	At shot blade	After harvest
Soda	6″—12″	4·03	2·26	1·23	2·98	4·28
Potash	6″—12″	1·11	0·91	0·82	0·86	1·11
Magnesia	6″—12″	11·55	13·96	12·55	13·85	13·53
Total bases	6″—12″	55·31	55·23	56·10	55·70	58·10
Soda	12″—1′ 6″	3·55	2·56	1·36	2·66	3·44
Potash	12″—1′ 6″	0·90	0·95	1·07	1·04	0·99
Magnesia	12″—1′ 6″	14·21	15·35	13·62	12·93	13·48
Total bases	12″—1′ 6″	50·92	50·84	48·00	50·30	50·80

* Average of six samples.
† Average of three samples.

(ii) the increase is continuous with the growth of the Sorghum crop.

Sorghum or cholam....*Andropogen Sorghum.*
Spiked Millet....*Pennisetum typhoideum.*

It is not known how exactly this increase in Sodium ion is brought about, but it goes a great way to explain the greater deflocculation and the changes in the physical condition of the Sorghum soils, more particularly their reduced permeability.

In addition, a good deal of evidence has accumulated, in the course of our work, which shows that the explanations usually offered for this phenomenon, *viz.*, soil exhaustion, particularly in nitrogen, toxicity due to the decomposition of plant residues are not in themselves adequate. For example, the injury to the succeeding crop is not seen unless the Sorghum crop is allowed to set seed. Addition of nitrogenous manures like Ammonium Sulphate did not remedy the defect nor did the incorporation of Sorghum stubbles brought from outside, give rise to the adverse after-effects.

It looks as though other causes than those abovementioned are responsible for the injury; the increase in Na-ion is probably one such.

V. RAMANATHA AYYAR.
S. KASINATH.
M. R. BALAKRISHNAN.

Agricultural College
and
Research Institute,
Coimbatore,
July 6, 1935.

On a Method of Preparing Large Thin Sections of Plants by Grinding.

IT is a well-known fact that palm-stems show a peripheral crowding of fibro-vascular bundles in their anatomical structure. This