

phenoxyacetic acid contained 96 per cent of the sodium salt. All rates of application below refer to lb./acre of active principle (that is, the pure ester for the first compound and the pure acids for the other two).

The applications were made at different intervals (0-8 weeks) prior to crop sowing, and these were followed by observations on subsequent crop-growth and weed-control. The main experiments were on kale and mangolds; but lettuce, onions, field beans, peas, lucerne, sugar beet and swedes were included in the second year.

The results can be summarized as follows:

WEEDS

iso-Propylphenylcarbamate (1) alone: At 2½ and 5 lb./acre, good control of grasses and *Polygonum* spp. was achieved.

'Methoxone' (2) alone } The two compounds were very similar
2,4-Dichlorophenoxy- } in effect. 1-2 lb./acre prevented the
acetic acid (3) alone } emergence of a range of weed species.

1 and 2 } Mixtures of (1) at 5 lb./acre and (2) or (3) at 1 lb./acre gave
1 and 3 } excellent weed control, each acting upon the weed species
susceptible to it. Against chickweed (*Stellaria media*) and
cleavers (*Galium aparine*), the mixture was better than
either component alone.

In general, the weed-killers were more effective when applied prior to the emergence of the weed seedlings and when there was the least possible subsequent disturbance of the surface soil.

CROPS

(1) alone: 5 lb./acre was without effect on kale, mangolds, lettuce, onions, beans, peas, lucerne, sugar beet and swedes even when applied as late as two weeks prior to sowing.

(2) alone } The minimum safe period between application and seed
(3) alone } sowing for most of the above crops when the dose was
1 lb./acre was three to four weeks. Heavier doses re-
quired longer periods.

(1) and (2) } Mixtures of (1) at 5 lb./acre and (2) or (3) at 1 lb./acre
(1) and (3) } gave results on the crops very similar to those of (2) or
(3) alone at 1 lb./acre.

The preliminary trials summarized in this communication are being extended to cover a range of soil and climatic conditions; but, although the conclusions are only tentative, they point to new possibilities of weed control in crops where at present few chemical methods are available. Full publication will be made when adequate conclusive evidence has been obtained.

W. G. TEMPLEMAN
J. O. WRIGHT

Imperial Chemical Industries, Ltd.,
Jealott's Hill Research Station,
Bracknell, Berks.
Feb. 7.

¹ Templeman, W. G., and Sexton, W. A., *Proc. Roy. Soc.*, B, 133, 300 (1946).

² Templeman, W. G., and Sexton, W. A., *Proc. Roy. Soc.*, B, 133, 480 (1946).

Nitrate Accumulation in Uganda Soils

In preliminary work¹ evidence has been obtained of the accumulation of notable quantities of nitrate nitrogen on a bare soil. Under a grass mulch this effect is not shown; in fact, an initially high nitrate status is depressed by the application of a grass mulch. Both the rise in nitrate content on a bare soil and the fall under a mulch take place on the onset of rains. A soil newly opened from grass has a low nitrate status² and there is a time-lag of several weeks before a build-up of nitrate occurs.

These results were obtained at the main research station at Kawanda on a soil with a pH of 6.3 under an annual bi-modal rainfall of a little more than 40 in. Similar results are now being obtained on a soil of pH 5.0 under the same rainfall conditions and

on a soil, in the eastern province of Uganda, of pH 6.0 with a rainfall of about 54 in. (bi-modal). We are therefore encouraged to believe that the phenomena described may be of wide occurrence, at least throughout East African conditions.

The quantities of nitrate built up are considerable; seasonal figures of 500 p.p.m. have been recorded, and a figure of 200 p.p.m. seems to be not unusual. It is thought that the development of such high amounts of nitrate, apart from their agricultural significance, which may be considerable, may also be important pedologically and have a bearing on soil-forming processes under these conditions.

G. AP GRIFFITH
H. L. MANNING

Agricultural Research Station,
Kawanda, Kampala.
Oct. 19.

¹ ap Griffith, G., and Manning, H. L., *Trop. Agric.* (in the press).

² ap Griffith, G., *E. African Agric. J.*, 14, No. 4, 187.

Elastic Properties of Ox Synovial Fluid

THE viscosity of synovial fluid varies with the shear stress, and there is evidence that the liquid contains elongated particles of a complex of hyaluronic acid and protein¹. It therefore seemed reasonable to inquire whether synovial fluid, like certain solutions of linear polymers^{2,3,4}, might also show shear elasticity. Some information on this aspect of its rheological behaviour has now been obtained with a co-axial cylinder elastoviscometer which will be described elsewhere by two of us (B. A. T. and D. J. S.) in collaboration with J. G. Oldroyd.

The tests were made at 25° C. on a pooled sample of ox synovial fluid: this contained 0.08 gm. of hyaluronic acid/100 ml., and its relative viscosity (measured at 25° C. in an Ostwald viscometer of 2 ml. capacity and water-time 12 sec.) was 16.8. The results of two experiments with the elastoviscometer, though not readily interpretable quantitatively, showed that the behaviour of this liquid when subjected to periodic stresses was similar to that of certain dilute poly(methyl methacrylate) solutions (for example, a mixture of 'Perspex' and *n*-butyl acetate containing 1.5 gm. of polymer/100 ml.). Since there is reason to attribute the observed behaviour of these latter materials to shear elasticity, we conclude that synovial fluid also shows this property.

It seems possible that the shear elasticity of synovial fluid may be of significance with regard to its function in joints. Thus, the fluid will yield less under stress rapidly applied than if it were a merely viscous liquid, and this might serve to protect the synovial membranes when a sudden stress is applied to the joint.

A. G. OGSTON
J. E. STANIER

Department of Biochemistry,
University, Oxford.

B. A. TOMS
D. J. STRAWBRIDGE

Courtaulds, Limited,
Research Laboratory,
Maidenhead.
Dec. 5.

¹ Ogston and Stanier, *Biochem. J.* (In the press).

² Philippoff, *Phys. Z.*, 35, 834, 900 (1934).

³ van Wazer and Goldberg, *J. App. Phys.*, 18, 207 (1947).

⁴ Smith, Ferry and Schremp, *J. App. Phys.*, 20, 144 (1949).