174·0. $[\alpha]_D^{20}$ for acid *B* was found to be − 179·5° (water, 20 mgm. in 0·5 ml.); Eijkman[3] gives $[\alpha]_D^{18}$ for shikimic acid as − 183·8° (water, *C* = 4·03 per cent).

Acid *B* and shikimic acid gave identical $R_F$ values (alone and mixed) in the three solvent systems mentioned above. It has now been shown that the two spots of closely similar $R_F$ values found previously for acid *B* and shikimic acid were due to contamination of acid *B* with glyceric acid, some, at least, of which was probably formed by the action of the anion exchange resin on the sugars of the original grass extracts during the separation of the acids. We have found that even weakly basic anion exchange resins such as 'Deacidite G' react in the 'OH' form with sugars to give several acids, including glyceric acid, which has an $R_F$ value similar to shikimic acid in the three solvent systems used. In the present work this difficulty was overcome by using 'Deacidite G' in the acetate form for the separation of the acids from the sugars in the grass extracts freed from amino-acid.

It is now beyond doubt, therefore, that acid *B* of grass is shikimic acid. Work is proceeding on the isolation of the other unidentified acids in the grass extracts, and the results will be reported in detail elsewhere.

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## Effect of α-Naphthalene Acetic Acid on Yield of Indian Cotton

Reduction in boll shedding was noticed when injuries to the cotton plant were reported as a result of spraying with 2,4,dichlorophenoxy acetic acid[1]. Depletion of non-reducing sugars and accumulation of proteins and amino-acids are common effects of several synthetic hormones[2]. Applications of α-naphthalene acetic acid and certain other growth regulators have been found to effect an increase in the setting percentage of bolls and yield of seed cotton[3]. The effects of the applications of these hormones on photosynthetic activity and fruiting with enhanced carbohydrate–nitrogen metabolism in the cotton plant have been recently studied[4].

Most of these observations were made on American or other exotic varieties of cotton. A preliminary investigation on the effects of α-naphthalene acetic acid on the carbohydrate changes in the leaves and yield of seed cotton of Dhar 43 (an improved strain of Bhoj, *Gossipium arboreium*) was undertaken during the 1953–54 cotton season. An attempt was made to find whether the application of α-naphthalene acetic acid as a spray on desi (Indian) cotton plants would prove beneficial at the active stage of vegetative growth or at the onset of the reproductive phase. The hormone was applied in three doses, of 10, 20 and 30 parts per million.

Table 1

| Treatment | Yield of seed cotton (lb. per acre) | Increase over control | Increase (per cent) |
|---|---|---|---|
| Control | 466·2 | — | — |
| Early spray at the active stage of vegetative growth : | | | |
| 10 p.p.m. | 567·0 | 101·4 | 21·75 |
| 20 p.p.m. | 537·6 | 71·4 | 15·31 |
| 30 p.p.m. | 516·6 | 50·4 | 10·81 |
| Late spray at the commencement of reproductive phase : | | | |
| 10 p.p.m. | 582·6 | 116·4 | 24·96 |
| 20 p.p.m. | 593·2 | 127·0 | 27·24 |
| 30 p.p.m. | 569·1 | 102·9 | 22·07 |

Standard error of response over control, 45·8; significant difference, 97·5.

Carbohydrate–nitrogen status in the leaves of the plants receiving late spray was higher at certain stages of growth than all other early spray treatments and the control. Also, there appears to be more effective carbohydrate utilization by plants receiving late spray, because of their comparatively higher yield of seed cotton than any other early spray treatments.

Early spray of 10 p.p.m. of α-naphthalene acetic acid and all the three late-spray treatments showed statistically significant increase in the yield of seed cotton over the control. Percentage increases in yield were more in late-spray treatments than in early-spray treatments.

These observations are being extended for confirmation and will be published in detail elsewhere.

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## Distribution of *Pelmatohydra oligactis* (Pallas) in Scotland

Since 1918, *Hydra vulgaris attenuata* and *Hydra vulgaris vulgaris* have been cultivated in the Notre Dame Laboratory for teaching purposes. Very occasionally these cultures have had to be replenished from outside sources. It was not until 1946 that I noticed the occurrence of *Pelmatohydra oligactis*, which I felt sure had been introduced in material obtained from a dealer in the south of England. The *Hydra vulgaris vulgaris* were completely ousted by the rapid spread of *Pelmatohydra oligactis*. In October 1947 all the specimens were reproducing