4-tetrahydronaphthalene (II) which played a key role in the structure elucidation of manicol (I) will be published elsewhere.

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STUDIES OF SOME NAPHTHOTHIA-AZA COMPOUNDS AS PLANT GROWTH PROMOTERS

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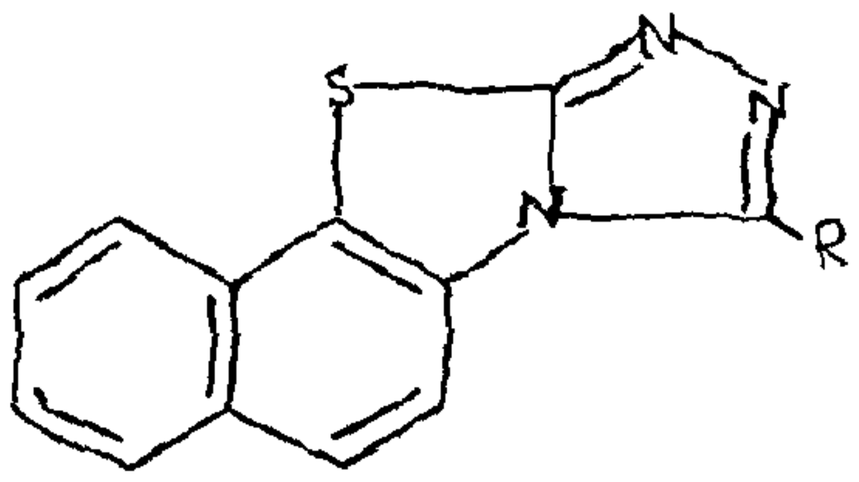
It has been already reported[1,2] that some benzothiazolyl hydrazones are growth promoters in some leguminous plants. Studies are made of some condensed thiazole systems on nodulation by Kulkarni *et al.*[3] and the results were statistically significant. Hence naphthalene system was selected in place of simple benzo-compounds. Hydrazino naphthothiazole[4] was condensed with aldehydes using ethanol as a solvent. The hydrazone was filtered off and recrystallized by DMF. *s*-Triazolo (5, 4-*b*) naphtho (2, 1-*d*) thiazole[5] (I), 3-mercapto-*s*-triazolo (5,4-*b*) naphtho (2, 1-*d*) thiazole (II), 3-hydroxy-*s*-triazolo (5, 4-*b*) naphtho (2, 1-*d*) thiazole (III) and 3-methyl-*s*-triazolo (5, 4-*b*) naphtho (2, 1-*d*) thiazole (IV) and the hydrozones selected 5 chloro salicyl (V), *p*-hydroxy phenyl (VI) and phenyl naphthothiazolyl (VII) hydrazones were prepared in this laboratory[6].

Solution of each compound had a concentration of (5 ppm). Gibberellic acid (GA_3) was used as standard and sterile water was kept as control. *Cicer arietinum* was selected as the leguminous plant. Blotters were sterilized at 15 psi for 20 min before use. The experiment was set up in duplicate, 10 seeds in every petridish. Root and shoot lengths were determined. On third day 5 seeds along with root and shoot were dried at $60 \pm 2^{\circ}$ C (Table I). Root and shoot parts were separated, crushed in water and the extract was filtered (15 ml). From this solution amino acids were identified using butanol : acetic acid : water (4 : 1 : 5). The amount of nitrogen was estimated by Kjeldahl's method. Trichloroacetic acid[7] was used for the separation of protein part from non-protein part.

Table 1 includes the root and shoot length, the percentage difference, amount of nitrogen before and after trichloroacetic acid treatment, the weight of residue from trichloroacetic acid treatment respectively.

Present investigation strengthens our view that the B_z nucleus, when replaced by polynuclear hydrocarbon, helps in the plant growth activity. It is not only the methyl electron donating group[8] at B_z that increases the length and dry matter but also the naphthalene ring attached to thiazole system.



S-Triazolo (5,4-b) Naphtho (2,1-d) Thiazoles

R = —H, —SH, —OH, —CH_3

Naphthothiazolyl Hydrazones

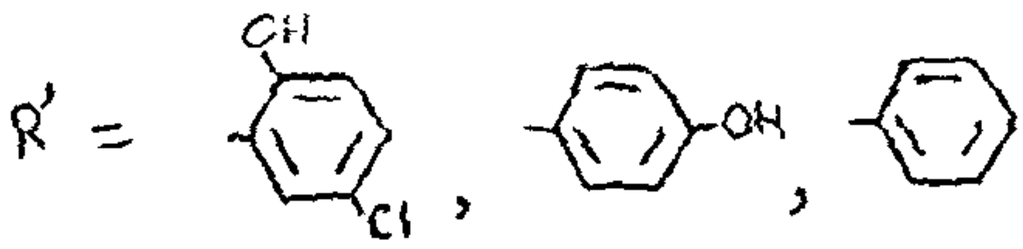


TABLE I

Effect of compounds on root (R) and shoot (S) lengths, percentage difference, nitrogen content and weight of residue

No. (Names given in introduction)	Length (cm) R	S	Percentage difference in wet and dry weights	Total nitrogen R	S	Nitrogen after TCA non-protein nitrogen R	S	Residue after TCA (g) protein nitrogen R	S
I	5·0	1·1	80	0·358	0·582	0·192	0·131	0·021	0·008
II	4·3	0·9	78	0·134	0·134	0·174	0·122	0·019	0·009
III	5·2	1·15	72	0·268	0·404	0·157	0·131	0·020	0·019
IV	5·0	1·2	78	0·313	0·224	0·140	0·148	0·019	0·018
V	5·1	1·2	78	0·358	0·224	0·166	0·166	0·018	0·018
VI	4·1	1·0	77	0·224	0·291	0·245	0·087	0·015	0·016
VII	4·4	1·1	78	0·313	0·224	0·140	0·034	0·011	0·017
Gibberellic acid (standard)	3·9	1·2	79	0·313	0·268	0·175	0·078	0·011	0·019
Control	3·8	0·85	77	0·313	0·358	0·157	0·087	0·014	0·019

R = root S = shoot

TCA—Trichloroacetic acid

In the case of shoot the lengths in (IV) and (V) are equal to standard gibberellic acid whereas in other compounds though less than standard are better than control. (II) seems to have inhibitory effect in both shoot as well as root (Table I).

As regards nitrogen in root, in the case of treatments (I) and (V), the amount of nitrogen before TCA treatment was more than control and standard whereas in case of (IV) and (VII) it was found to be nearly equal to control and standard. In (III) and (VI) it was less than control and standard. After TCA treatment except compounds (I) and (VI) in all other cases the amount was less than standard. This can be attributed to the unsubstituted cyclic system or the position of hydroxyl group in uncyclized part. In case of shoot before TCA treatment with (I), (III) and (VI) treatments, the amount of nitrogen was more than standard, whereas, in other cases it was less. After TCA treatment it was found to be better than control and standard in all compounds except in (VII). In general (VII) seems to have inhibitory effect.

As regards the amino acids it is found that (III) and (VI) treatments prevented the formation of glutamic acid and alanine which were present in other treatments. In the treatment with compounds (IV), (V) and (VII) aspartic acid was conspicuously absent. If comparison is made amongst root and shoot it was observed that methionine was present in root except control whereas it was totally absent in shoot. The role of hydroxyl group in these systems towards growth and amino acid formation appears to be effective.

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