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SHORT COMMUNICATION

INHIBITION OF THE GERMINATION OF MUSTARD SEEDS BY SATURATED FATTY ACIDS

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Abstract—Germination of mustard (*Sinapsis alba* L.) seeds was found to be inhibited by certain saturated fatty acids. The greatest inhibition was with nonanoic acid.

INTRODUCTION

IT IS known that saturated fatty acids of specific chain lengths can inhibit certain metabolic processes in animals and in lower plants.[1] The only report of similar occurrences in higher plants is by Tso[2] who found that bud growth in *Nicotiana tabacum* L. was inhibited by the methyl esters of some fatty acids, most effectively by methyl decanoate.

During the course of an investigation on the phytotoxicity of higher halogenated fatty acids, it was found that the unsubstituted saturated acids used as controls were more toxic to the germination of mustard (*Sinapsis alba* L) than were the corresponding halogenated acids. The acids between C_2 and C_{19} were studied and it was found that the inhibition of germination increased with chain length up to a maximum at C_9 and then decreased with further increases in the length of the carbon chain (Table 1). The facts that the inhibitory activity does not increase with chain length beyond C_9, and that oxidative processes in animals and lower plants are inhibited most strongly by acids of similar chain lengths, would suggest that the inhibition is associated with some interference in metabolism rather than it is an effect due to surface tension or lipid solubility: such effects would be expected to increase with chain lengths beyond C_9.

EXPERIMENTAL

The experimental procedure was essentially that described by Munkata *et al.*[3] The acids used were commercial samples obtained from Koch-Light Laboratories Ltd., or from British Drug Houses Ltd. They were neutralized with sodium hydroxide before use. Three ml of the solution in an appropriate concentration were used to moisten a filter paper in a petri dish containing 50 mustard seeds. The dishes were placed in the dark at 25°, and inspected 3 and 7 days after moistening. Each trial was repeated several times to ensure reproducibility. The percentage germination of the controls was 96–100, and germinations of this order are all recorded as being 100.

[1] R. M. HOCHSTER and J. H. QUASTEL, *Metabolic Inhibitors*, Academic Press, N.Y. (1963).
[2] T. C. TSO, *Nature* **202**, 511 (1964).
[3] K. MUNAKATA, K. YOKOYAMA, T. SHIBATA, A. HARADA and F. HARA, *Weeds* **7**, 470 (1959).

TABLE 1. GERMINATION OF MUSTARD SEEDS IN THE PRESENCE OF SATURATED FATTY ACIDS

Acid	No. of carbon atoms	Percentage germination in the presence of sodium salts of the acid in the following concentrations (g/l.)*		
		1	0·5	0·1
Acetic	2	100	100	100
Propionic	3	100	100	100
Butyric	4	100	100	100
Valeric	5	89	94	100
Hexanoic	6	87	91	100
Heptanoic	7	0	0	100
Octanoic	8	0	0	43
Nonanoic	9	0	0	0
Decanoic	10	0	0	0
Undecanoic	11	0	0	100
Dodecanoic	12	79†	75†	100
Tridecanoic	13	49†	94†	100
Myristic	14	90†	100	100
Pentadecanoic	15	39†	100	100
Palmitic	16	81†	100	100
Heptadecanoic	17	63†	100	100
Stearic	18	83	100	100
Nonadecanoic	19	82	100	100

* Growth was 100 per cent with each acid at 0·01 g/l.; at 0·05 g/l., growth was 100 per cent with all acids except nonanoic (C_9) where it was 9 per cent that of the control.

† Rate of growth extremely slow