

NEMATICIDAL PROPERTIES OF DIFFERENT AROMATIC FRACTIONS OF PETROLEUM

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Six aromatic fractions of petroleum (one of them chlorinated) were tested for their nematicidal properties against *Helicotylenchus* sp. The toxicity of these fractions was compared with that of Nemagon. The results indicate that Fraction 400N has got more nematicidal properties than the remaining fractions as it showed 100% mortality of *Helicotylenchus* sp. at a concentration of 30 ppm after 24 hr of treatment.

Although Needham¹ discovered *Anguina tritici* causing ear-cockle disease of wheat in as early as 1743 and Butler² carried out excellent work on the "Ufra" disease of rice caused by *Ditylenchus angustus*, it was only recently that the importance of plant parasitic nematodes as agents of destruction of crops was realised. It has been estimated that nematodes cause 10-20% of the total damage caused by the pests and in the United States alone losses amounting to \$2,000,000,000³ annually. Although such statistics for Pakistan are not available yet it is supposed that nematodes cause heavy losses annually which is evidenced by the fact that almost all the crops—rice, cotton, jute, sugarcane, tea, tobacco, fruit trees, vegetables and ornamental plants are attacked by nematodes. Banana and papaya (among the fruit trees) and tomato, okra, brinjal, cauliflower, potato and turnip etc. (among the vegetables) grown in the southern west Pakistan are being severely damaged due to the nematode attacks. In this connection the records of Timm,^{4,5,6} Brown,⁷ Kafi⁸ and Akhtar⁹ are worth mentioning.

Six aromatic fractions of petroleum were tested for their nematicidal properties. *Helicotylenchus* sp. which parasitises banana and other crops was used as test nematode.

Materials and Methods

Bioassays were carried out for testing the nematicidal properties of these substances. One per cent solution of each substance was prepared in different solvents from which solutions of the strength of 10, 20 and 30 ppm were prepared as testing media for the nematodes.

Nematodes belonging to the genus *Helicotylenchus* were isolated from the soil around the banana roots. Isolation was done by modified Baermann technique in which about 100 ml of soil was spread over a tissue paper placed on a sieve which was already kept in an enamel tray. Water was poured into the tray till the sieve base was just awash and the tray was placed in a cool place.

After 12 hr water was transferred to the flask and left for about 2 hr and was then decanted. Mature *Helicotylenchus* specimens were isolated under binoculars. Identification was done after Thorne.¹⁰

One hundred mature nematodes were taken for each treatment of different solutions. Three replicates were kept and the experiment was repeated three times. Per cent mortalities of *Helicotylenchus* sp. were counted after 24 hr of treatment and were corrected by using Abbott's formula. For comparison Nemagon was used.

TABLE I.—SHOWING THE TOXICITY OF DIFFERENT AROMATIC FRACTIONS OF PETROLEUM AND NEMAGON AGAINST *Helicotylenchus* sp.

| Substance | Strength ppm | % mortality after 24 hr |
|---------------------------|--------------|-------------------------|
| Solvent A | 10 | 12.3 |
| | 20 | 17.5 |
| | 30 | 61.8 |
| Fraction bright stock HVI | 10 | 14.3 |
| | 20 | 48.4 |
| | 30 | 63.9 |
| Fraction light extract | 10 | 15.7 |
| | 20 | 52.7 |
| | 30 | 73.6 |
| Solvent B | 10 | 38.1 |
| | 20 | 71.4 |
| | 30 | 93.6 |
| Fraction 400N | 10 | 35 |
| | 20 | 65 |
| | 30 | 100 |
| Naptha (chlorinated) | 10 | 49.4 |
| | 20 | 95.7 |
| | 30 | 100 |
| Nemagon | 10 | 65 |
| | 20 | 95 |
| | 30 | 100 |

Results and Discussion

Per cent mortalities due to the toxic effect of different aromatic fractions of petroleum and Nemagon have been given in Table 1. From these data it is clear that Fraction 400N and Naptha have more nematocidal properties than the remaining fractions as each of them showed 100% mortality of nematodes at 30 ppm after 24 hr of treatment. Solvent B also appears to have good nematocidal properties as it showed mortality rate at 10 and 20 ppm more than the fraction 400 N, but at a concentration of 30 ppm the mortality rate was lower than in Fraction 400N. Since naptha was chlorinated and Fraction 400N was not chlorinated it may be concluded that the latter is a better nematocide than all the remaining substances which were tested presently.

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References

1. T. Needham, *Philos. Trans. Roy. Soc.*, **42**, 173, 634 (1743).
2. E. J. Butler, *Agr. Res. Inst. Pusa, India Bull.*, **34**, (1913).
3. A.L. Taylor, *Introduction to Research on Plant Nematology* (Food and Agricultural Organization of the United Nations, 1961) p. 1.
4. R.W. Timm, *Pakistan J. Sci.*, **7**, 47 (1955).
5. R.W. Timm, *Pakistan Rev. Agr.*, **2**, 115 (1956 a).
6. R.W. Timm, *Pakistan J. Biol. Agr. Sci.*, **2**, 39 (1959).
7. K.F. Brown, A Survey of some Plant Parasitic Nematode Problems in Pakistan. Report of the visiting Nematologist, courtesy Shell International Chemical Company Ltd. (1962).
8. A. Kafi, *Plant Parasitic Nematodes in Pakistan*, Technical Bulletin No. 32, FAO Regional Office for Asia and Far East, Bangkok (1963).
9. S.A. Akhtar, *Pakistan J. Sci.*, **13**, 176 (1961).
10. G. Thorne, *Principles of Nematology* (McGraw-Hill, 1961), p. 195.