

and Paphthion better than the susceptible strain (Takatsuki), and for the esters, only Misaki strain exhibited a higher carboxylesterase activity to methyl-*n*-butyrate and *p*-nitrophenyl acetate.

Eserin and EDTA had no effect on the degradation of Malathion in all the strains. Sapporo and Shuri strains, as expected, were considerably inhibited by DDVP which was known to be a carboxylesterase inhibitor.

Both supernatant and sediment (10,000 × g, 20 min, 0°C) fractions were used as enzyme sources.

It was shown that the sediment fractions from Sapporo and Shuri strains degraded Malathion more than the supernatant fractions.

It was proved that characters of the enzymes of Sapporo strain were different from those of Misaki strain, but similar to those of Shuri strain. Susceptibility of Shuri strain to some insecticides, however, was different from that of Sapporo strain.

Therefore it seems likely that Shuri strain may have other resistant factors.

Efficacy of "Vydate" Oxamyl for the Control of Root-Knot Nematode, *Meloidogyne incognita* (Kofoid & White, 1919) Chitwood, 1949, Attacking Tomato. M. MashkooR ALAM, Abrar M. KHAN and S. K. SAXENA (Section of Plant Pathology & Nematology, Department of Botany, Aligarh Muslim University, Aligarh-202001, India) Received May 20, 1975. *Botyu-Kagaku*, 40, 159, 1975.

30. トマトを加害するネコブセンチュウ *Meloidogyne incognita* に対する "Vydate" Oxamyl の効果 M. MashkooR ALAM, Abrar M. KHAN and S. K. SAXENA (Department of Botany, Aligarh Muslim University, India) 50. 5. 20 受理

トマトに寄生するネコブセンチュウを防除するため、"Vydate" oxamyl (methyl *N', N'*-dimethyl-*N*-[(methylcarbomyl) oxy]-1-thiooxamidate) 1,200 ppm 液にタバコ 苗の根を30分間浸漬してから移植し、その後毎週1回5週間連続して茎葉に噴霧すると著しい効果がある。葉害は全く認められない。茎葉噴霧だけではあまり効果がない。

The root-knot nematode, *Meloidogyne* Spp. causes enormous losses to vegetables every year (Swarup and Seshadri²⁾, 1974) and can be regarded as pest No.1 of vegetables in India. D-D and some other halogenated hydrocarbons have been successfully used as fumigants for the control of root-knot (Hart and Maggenti⁴⁾, 1971; Brodie and Good²⁾, 1973). However, all these nematocides are phyto-toxic and thus require a long waiting period before a crop is sown. Recently, some systemic nematocides have been used successfully for controlling nematodes without being phyto-toxic. "Vydate" oxamyl (Methyl *N', N'*-Dimethyl-*N*-[(methylcarbomyl) oxy]-1-Thiooxamidate), has been used as drench and foliar applications for controlling root-knot, on pole beans and roses by Radewald *et al.*⁶⁾(1970); on groundnut by Dickson and Smart³⁾(1971). Hart and Maggenti⁴⁾(1971) applied oxamyl to rose root stocks as drench, root-dips and foliar spray treatments and found that drench treatment was most effective

against *M. hapla*. Miller⁵⁾(1971) found that repeated foliar sprays with oxamyl on gardenia plants almost eradicated the root-knot nematode, *M. incognita* and it was as good as drench or bare-root-dip treatments. Alam *et al.*¹⁾(1973) found that a 30 minute root-dip with oxamyl (1,200 ppm, active ingredient) followed by five successive weekly foliar-sprays reduced the root-knot development on eggplant, however, on okra five weekly-sprays alone were not much effective. In the present paper, the efficacy of "Vydate" oxamyl for the control of root-knot nematode, *M. incognita* on tomato has been reported.

Materials and Methods

Three-week-old seedlings of tomato var. Marglobe, raised in autoclaved soil, were dipped in an aqueous solution of "Vydate" oxamyl (1,200 ppm, active ingredient) for 30 minutes and later transplanted to 10 cm clay-pots having 250 g of steam sterilized soil, sand and compost mixture

(70:20:10), and were immediately inoculated with 1,000 freshly hatched larvae of *M. incognita*. These seedlings were also given an extra dose of the same concentration of oxamyl as foliar sprays at weekly intervals, starting from the day of transplantation. Some of the seedlings were given only spray treatment. While spraying care was taken, not to allow the chemical to fall on the soil. This was done by covering the soil around the plant in the pot by blotting paper. Appropriate controls were run. Each treatment was replicated thrice. Observations were taken 60 days after inoculation. System of rating for the root-knot index used, was as follows: 0=no galling, 1=light galling, 2=moderate galling, 3=heavy galling and 4=severe galling.

Results and Discussion

As evident from Table 1, thirty minutes root-dip treatment in "Vydate" followed by 2, 3, 4 or 5 weekly-sprays of the nematocide were more effective as compared to sprays alone in reducing the root-knot development on tomato. Complete inhibition in the root-knot development was observed when plants were dipped for 30 minutes

in "Vydate" followed by 5 weekly-sprays of the nematocide. The root-knot index on plants dipped for 30 minutes was 2.00 and on plants dipped for 30 minutes followed by 2, 3 or 4 spray treatments was 1.25, 0.83 and 0.33 respectively as compared to 3.00 in control. In none of the plants receiving only sprays, there was complete inhibition in the root-knot development. The root-knot index, on plants receiving sprays alone, was 2.66, 2.33, 2.50, 2.50 and 2.00 for 1, 2, 3, 4 and 5 sprays, respectively. The reduction in root-knot development was statistically significant only with 5 sprays.

In "Vydate" treated plants there was an overall increase in the weight of plants. The increase in weight over untreated ones was highly significant in plants receiving 5 foliar sprays only and also in those dipped for 30 minutes followed by different sprays. The plant weights, in treatments with 30 minutes root-dip followed by 2, 3, 4 or 5 foliar sprays, was almost equal to uninoculated control, thereby, showing that "Vydate" oxamyl can be used for standing crop of tomato without any sign of phyto-toxicity.

Table 1. Efficacy of "Vydate" oxamyl used as root-dips and foliar sprays in controlling root-knot on tomato cv. Marglobe.

S. N.	Dip time (mts)	Number of sprays	Green weight (g)			Root-knot index
			Shoot	Root	Total	
1	0	0	6.50	2.50	9.00	3.00
2	"	1	6.83	2.66	9.49	2.66
3	"	2	7.66	3.00	10.66	2.33
4	"	3	7.75	3.43	11.18	2.50
5	"	4	8.75	3.33	12.08	2.50
6	"	5	9.83	3.83	13.66	2.00
7	30	0	10.75	4.00	14.75	2.00
8	"	1	9.50	4.75	14.25	2.15
9	"	2	12.00	6.25	18.25	1.25
10	"	3	11.16	6.00	17.16	0.83
11	"	4	12.16	6.66	18.82	0.33
12	"	5	11.33	6.33	17.66	0
13	0	0	11.66	6.16	17.82	0
<i>L. S. D. (at 5% level)</i>			2.477	1.032	3.096	0.525
<i>L. S. D. (at 1% level)</i>			3.356	1.398	4.196	0.713

Nos. 1 to 12=inoculated with root-knot larvae, No. 13=un-inoculated. Each value in an average of three replicates.

Summary

"Vydate" oxamyl (1,200 ppm, active ingredient) gave a good control of the root-knot nematode, *Meloidogyne incognita* on tomato, when used for 30 minutes as bare-root-dip followed by 5 weekly-sprays successively. However, 30 minutes' dip treatment followed by 2, 3 or 4 sprays reduced the root-knot development to a lesser degree. Foliar sprays alone, even 5 sprays, were not very effective. In all the treated plants with 30 minutes root-dip followed by 2, 3, 4 or 5 foliar sprays the plant growth was almost equal to untreated controls, thereby showing that "Vydate" oxamyl is not at all phyto-toxic.

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抄 録

ハネカクシの防御物質：イリドジアールと4-メチルヘキサノン-3の同定

Iridodial, and a New Alkanone, 4-Methylhexan-3-one, in the Defensive Secretion of the Beetle, *Staphylinus olenes*, L. J. FISH, G. PATTENDEN, *J. Insect Physiol.*, 21, 741 (1975).

最近、数種のハネカクシ科昆虫の防御物質に関する研究が行なわれ、テルペン類、脂肪族炭化水素、キノン、アルカロイド等の化合物が発見された。今回、英国にいるハネカクシでは最も大きいオオハネカクシの1種 (*Staphylinus olenes*) について、腹部臭腺からの分泌物をキャピラリーで採集したもの、及び臭腺を抽出した抽出物についての含有成分について報告する。

採集直後の試料の GLC (5% SE-30) では、主成分のピーク1つと、2つの微量成分があることを示した。主成分は、GC-MS から分子量168.1が得られ $C_{10}H_{16}O_2$ に相当する。2,4-DNP と反応してオレンジ色の結晶をつくり、IR, NMR から2つのアルデヒド基を持つことが示されたので、Iridodial と判明した。一方、微量成分の MS から2つの化合物はそれぞれ 4-methylhexan-3-one, 3-methylbutyraldehyde と推定された。

また、数週間時わえた試料には、2つの新しいピークがあらわれ、これらは Iridodial の環化した異性体とエタノールの反応したエチルエーテルとジエチルアセタールであることが証明された。少量のエタノールは試料採集前に殺菌のため体表を拭いた時の混入によるものである。

(高橋正三)

クロクサアリの道しるべフェロモン：6つの脂肪酸の確認

The Trail Pheromone of the Ant, *Lasius fuliginosus*: Identification of Six Components. S. HUWYLER, K. GROB, M. VISCONTINI, *J. Insect Physiol.*, 21, 299 (1975).

アリは、道しるべフェロモンを後腸から分泌するといわれているが、その化学成分の研究は少なく、*Atta texana*, *A. cephalotes* の methyl 4-methyl-pyrrole-2-carboxylate が知られているのみである。

クロクサアリの働きアリの後腸をとりだし、水、アルコール、エーテルで洗ってから内容をキャピラリーで吸いだした。10匹から約 $0.8 \mu\text{l}$ 得られる。実験室で飼育しているコロニーの働きアリ12,000匹がつくった通路からも抽出された。道しるべ作用の生物検定には、S-字路をつくり、その追跡数でしらべ、抽出物、精製の段階で活性が認められた。

GLC-MS で、抽出物を検討した結果、次の脂肪酸が検出された。10匹の働きアリに含まれている含量は次表の通りである。

成 分	量 (ng)
Hexanoic acid	12.9
Heptanoic acid	3.9
Octanoic acid	7.9
Nonanoic acid	7.5
Decanoic acid	7.7
Dodecanoic acid	9.1

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