ROLE OF HATCHING FACTORS IN LARVAL EMERGENCE FROM CYSTS OF HETERODERA ORIZICOLA, A NEMATODE PEST OF RICE

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EGGS retained in cysts (dead females) require specific stimulus to release the larvae, a behaviour unique in *Heterodera* sps. Picrolonic acid against *Globodera rostochiensis*[1], and flavionic acid against *H. schachtii* and other *Heterodera* sps.[2,3] were efficient stimulants where, the chain length between the two terminal polarisable atoms was the factor influencing hatching. In *H. oryzicola*, hatching was inhibited by blocking of the intermediary metabolism of pyruvic acid dehydrogenase which could be activated by thiamine hydrochloride[4]. The role of thiamine as a coenzyme with pyruvic acid dehydrogenase in the further metabolism of the energy rich pyruvic acid in animals has been established[5]. Most enzymes in the glycolytic acid and TCA cycles have been demonstrated in nematodes, Homogenates of *Ditylenchus triformis* utilised labelled glucose and pyruvate and converted them into carbon dioxide[6,7]. Hence the effectiveness of thiamine, which has only one terminal polarisable atom as a hatching factor was through the enzyme system[4].

To confirm the above contention, cycloheximide and thiamine hydrochloride were compared in rice root exudates by the methods described earlier[4]. Cycloheximide had strongly inhibited the hatching of larvae from eggs in cysts and egg masses by 95% and 93% respectively (Table I). This chemical is known to inhibit cytoplasmic protein synthesis in Eukaryotes[8]. The results proved beyond doubt that protein synthesis may be blocked by some inhibitors to effect dormancy in cysts and the restoration of the protein synthesis may be one of the functions of the hatching factors. Besides changing the permeability of a barrier and allowing the passage of water and solutes[9,10], increased oxygen uptake and change in adenylate energy charge[11,12], were also reported to occur in 24 hr and thought to be due to the primary action of the hatching factor.

As the juveniles inside eggs retained in the cysts of *H. oryzicola* enter dormancy but not those in the egg masses, in both the situations the blocking of, protein synthesis by cycloheximide inhibited the hatching (Table I). Thus, it may be concluded that dormancy could have been induced in the eggs retained inside cysts in response to the stimulus from the ageing and dyeing female while the eggs laid in the egg mass protruding outside the cyst are free from such factors inducing dormancy.

TABLE I

Effectiveness of hatching stimulants against eggs of H. oryzicola (*Cumulative hatch of* 3 *batches of* 50 *egg masses each during* 21 *days at* 28 ± 1° C) *in percentages*

Hatching stimulant	Conc.	Eggs inside		
		Egg mass	White cyst	Brown cyst
Distilled water		100*	100	100
Rice root diffusate of var CRM 13–3241	Undiluted	100	100	93–100
Thiamine hydrochloride	3 mM			123
Flavionic acid	3 mM			92
Cycloheximide	3 mM	93	93	95

* Hatch rating and percentage inhibition according to *Clarke and Shepherd*[1].

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