The effect of potato root diffusate on the desiccation survival of unhatched juveniles of *Globodera rostochiensis*

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Summary

Exposing cysts and free eggs of *Globodera rostochiensis* to potato root diffusate before subjecting them to desiccation decreased hatch, compared to controls exposed to soil leachate, when the cysts and eggs were stimulated to hatch after rehydratation. Loss of trehalose and alteration of egg-shell permeability is thought to be associated with exposure to potato root diffusate, rendering the unhatched juvenile more susceptible to desiccation.

Résumé

Effet des diffusats de racines de pomme de terre sur la résistance à la dessiccation des juvéniles non éclos de Globodera rostochiensis

Des kystes et des œufs libres de *Globodera rostochiensis*, primitivement mis pendant 24 heures en contact avec un diffusat de racine de pomme de terre, ont été soumis à la dessiccation et ensuite mis à nouveau en contact avec du diffusat de racine pour provoquer l'éclosion. Dans ces conditions, l'éclosion a été plus faible que chez des kystes ou des œufs qui avaient été primitivement mis en contact avec des percolats de sol. L'auteur pense que l'exposition au diffusat de racine cause une perte en tréhalose et une altération de la perméabilité du tégument de l'œuf

periods (Fig. 1). Batches of 20 cysts were transferred to separate cells on leucocyte migration plates (Sterilin Ltd.). Solutions surrounding the cysts were removed using filter paper slivers and each plate was placed in a small 550 cm^3 desiccation chamber containing coarse silica gel to give 0% relative humidity. After desiccation at 20° each batch of cysts was returned to the staining blocks and the cysts rehydrated for one week in artificial tap water. PRD was then added to the cysts and hatching tests were conducted at 20° for five weeks; hatched juveniles were counted weekly and total percentage hatch determined at the end of each

being taken at weekly intervals for four weeks. Using counts of the number of eggs immediately before desiccation, total percentage hatch was determined at the end of each test.

The increase in metabolism that occurs before eclosion (Atkinson & Ballantyne, 1977*a*, *b*) may make juveniles exposed to PRD more susceptible to desiccation by reducing their food reserves, especially lipids. To check this, eggs were hatched, by slight mechanical pressure, in artificial tap water and the juveniles were separated into two groups in leucocyte migration plates, one group being transferred to PRD and the other to soil leachate. After two days

Results

Fig. 1 shows the total percentage emergence of juveniles of *G. rostochiensis* from cysts after desiccation for various periods after exposure to PRD and soil leachate. There is a decrease in the hatch from cysts from both treatments with increase in the period of desiccation but the hatch from cysts treated with PRD was always at least 10% less than the hatch from cysts exposed to soil leachate. Analysis of variance after arcsin transformation of percentages confirms that the difference between the PRD and soil leachate pre-treatments is highly significant ($P < 0.01$). Even after eight weeks

desiccation, whereas a desiccation period of four weeks is required before the hatch from eggs treated with soil leachate declines to this level ; the hatch from the soil leachate group desiccated for three days is 62%. At all periods of desiccation up to and including three weeks the hatch from eggs treated with soil leachate before desiccation is at least 20% greater than the hatch from the PRD treated groups. The difference is not so great at the four weeks desiccation period only because the hatch from the PRD treated eggs was already almost zero. Analysis of variance, shows that the difference between the PRD and soil leachate pre-treatments is highly significant ($P < 0.01$). As with experiments on

juvenile relies upon to enable it to survive desiccation has been altered. Subsequent desiccation causes greater mortality in the PRD treated groups which is reflected in a lower hatch when the eggs or cysts are rehydrated and placed in PRD.

The present work with cysts and free eggs shows that desiccation significantly decreases hatch of juveniles exposed to PRD. Control experiments using artificially hatched juveniles suggest that the effect is not due to any changes induced in the juveniles themselves, but controls may not be perfect because release of juveniles from eggs could result in increased metabolism. Therefore, it is possible that the increase in metabolism of unhatched juveniles exposed to PRD may make them more susceptible to desiccation. However, this aspect is likely to be of only marginal importance as juveniles have almost no intrinsic ability to survive desiccation ; they rely on external factors for their protection. It is the removal or alteration of these factors which will have most effect on survival. Although the cyst wall is involved in protecting the unhatched juvenile from desiccation, comparison of the results from experiments with free eggs and cysts shows that changes in the cyst wall induced by PRD are, at most, of minor importance.

Although it is not absolutely certain that the

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