

A NEW RECORD OF CLUB ROOT DISEASE ON MUSTARD

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Club root disease of mustard (*Brassica campestris* L var *yellow sarson* Prain) has been observed in several districts of West Bengal during the last three years (1983–85) in c.v. 'Benoy' under irrigated *rabi* cultivation. The affected plants were stunted, appearing yellowish with progress of the disease; the roots, on examination, revealed swelling or formation of clubs of various size. There was reduction in the number of branches and pods as well as pod size in the diseased plants. Yield loss as high as 32.5% could be assessed by crop cutting experimental method.

The causal organism of the disease was identified as *Plasmo-diophora brassicae* Woron and confirmed by Dr D. J. Stamps of the Commonwealth Mycological Institute, Kew, Surrey, England (IMI 292504). This is the first record of Club root on mustard (*Brassica campestris* L var *yellow sarson* Prain).

EFFECT OF POLYOXIN COMPLEX—A CHITIN SYNTHESIS INHIBITOR ON IMMATURE STAGE OF *DYSDERCUS CINGULATUS*

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THE polyoxin complex is an antifungal mixture of peptidyl pyrimidine nucleoside antibiotics produced by *Streptomyces cacaoi* var *asoensis*. The structure of major and minor components of this mixture has earlier been described^{1–3}. The structural similarity of polyoxins to uridine diphospho-N-acetyl glucosamine (UDPNAG), the natural substrate of chitin synthetase was known to account for the competitive nature of their inhibition in fungi⁴. Also polyoxins have been shown to inhibit *in vitro* chitin synthesis in insects, both in an organ culture system⁵ and in excised abdominal integuments incubated under appropriate conditions⁶. *In vivo* toxicity of polyoxins towards insects has been first reported by Vardanis⁷. In his experiment with grass hopper nymphs, he observed

that death of the nymphs usually occurred at moulting stage. We report here the effect of polyoxin complex on 5th instar nymphal stage of hemipteran pest of cotton and other malvaceous crops—*Dysdercus cingulatus*.

The colony of *D. cingulatus* was reared in the insectary at $28 \pm 1^\circ\text{C}$ and 70% R.H. The nymphs as well as adults were fed on soaked cotton seeds in petri dishes. The sample of polyoxin complex was kindly provided as a gift by Dr Isono, Institute of Physical and Chemical Research, Japan. Early 5th instars nymphs of *D. cingulatus* were selected for the present investigation. Polyoxin complex was dissolved in distilled water and 1 μl of different dilutions of test compound was injected through the leg base into the haemolymph. Control nymphs were injected with distilled water alone. All experiments were performed in duplicate.

Application of polyoxin complex to 5th instar nymphal stage of *D. cingulatus* resulted in the death of nymphs while moulting to the adult stage (figure 1). Always a few of the nymphs that underwent normal moulting showed abnormal wings. Also at all dosages, the nymphal life was prolonged by 4–6 days and ultimately died as nymphs without moulting to the adult stage. Percent inhibition of growth was calculated from the graph drawn between the log dose and probit inhibition. The dose for 50% inhibition, calculated from the graph was found to be $12.746 \pm 0.035 \mu\text{g}$.

Similar results were reported on *D. superstitionus*⁸, *D. similis*⁹ and *D. cingulatus*¹⁰, with the chitin synthesis inhibitors diflubenzuron (dimilin) and penfluron. Gijswijt and Deul¹¹ compared the effects of dimilin with polyoxin D on *P. brassicae* larvae and found that both the compounds gave similar results. Histological sections of cuticles of affected larvae of *P. brassicae*, revealed similar abnormalities, like the disturbance of the regular endocuticular layer and the formation of globular coagulated particles.

The nymphs with prolonged nymphal life were dissected in insect ringer solution to observe any abnormality in the reproductive system. The female reproductive system showed very thin, long and filamentous oviducts in contrast to bulbous oviducts of control insects (figures 3, 5). The male reproductive system of nymphs with prolonged larval life showed thin and slender vas deferens. Also the size of the mesadene gland was reduced in treated nymphs (figures 2, 4). The adults with deformed wings did not show any abnormality in the reproductive system.

The prolongation of nymphal period of *D. cingulatus* after polyoxin complex application, suggests that