

protrusion of adventitious buds primordia appear from the cut ends of the explant, either singly or in rows (figure 3). After 20 days these progressively develop into adventitious buds possessing a clear dome-shaped shoot apex and leaf primordia with conspicuous vascular cambium (figure 4).

The major constraint in the present work is the low rate of plant differentiation from adventitious buds. This is due to retarded growth and the presence of callus at every stage of organogenesis studied. Further work is in progress to overcome this difficulty.

These findings, though preliminary, suggest the possibility of *in vitro* regeneration and micropropagation of castor, a project which has not yet been reported.

The authors are grateful to Profs. H. Y. Mohan Ram and Y. P. S. Bajaj for evincing interest and encouragement. KRKR is grateful to CSIR, New Delhi, for a fellowship.

30 June 1988

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ISOLATION OF NEWCASTLE DISEASE VIRUS (AVIAN PARAMYXOVIRUS-1) FROM PIGEONS (*COLUMBA LIVIA*) IN INDIA

GURKIRPAL SINGH, A. P. S. MANGAT and B. S. GILL

Department of Veterinary Public Health and Epidemiology, Punjab Agricultural University, Ludhiana 141 004, India.

AVIAN paramyxoviruses of serotype 1 have been

isolated from racing pigeons during the widespread outbreaks of a severe viral disease that spread from Italy through Europe in 1981 and 1982 and to Great Britain in 1983¹⁻⁴. The disease presented a clinical picture resembling the neurotropic form of Newcastle disease in poultry. Outbreaks of the disease and virus involved in Japan have recently been reported⁵. In March 1988, outbreaks of similar disease were observed in racing pigeons in parts of Punjab and in the Ambala city of Haryana.

Samples of pooled brain and viscera from sick pigeons were inoculated into the allantoic cavity of 9 to 10-day-old chicken embryos. Two viral isolates were recovered. With one viral isolate, initially there was no haemagglutination of chicken red blood cells; however, both the isolates were further passaged in eggs for identification. The passaged viral isolates were tested in haemagglutination inhibition (HI) tests as described⁶, using chicken anti-Newcastle disease virus (NDV) 'F' strain serum and convalescent serum from pigeons. Both the isolates were found to possess haemagglutinating antigens inhibited by the NDV antiserum and the convalescent serum from pigeons, thus identifying the agents as Newcastle disease virus. It appears to be the first report on the isolation of Newcastle disease virus, from pigeons, in India.

The results of HI tests conducted on six affected pigeons are given in table 1. Only two of the six paired sera showed a conversion from negative to

Table 1 Results of HI test on paired sera of six pigeons from Ludhiana

Serum specimen No.	Antigens**	
	NDV 'F' strain	54/88 virus (pigeon isolate)
*8811-1	<2	<2
8811-2	4	16***
8813-1	<2	<2
8813-2	8	16
8818-1	4	32
8818-2	8	64
8822-1	2	32
8822-2	2	16
8825-1	8	32
8825-2	4	32
8827-1	8	16
8827-2	8	64

*The interval between the first and the second specimens varied from 7 to 10 days; **Four haemagglutinating units were used in the HI test proper; ***Titres were expressed as reciprocals of serum dilutions.

positive against the NDV and 54/88 virus while one demonstrated a rise in antibody only against 54/88 virus. In both the remaining specimens, no significant differences in titres were found. The sera of unaffected pigeons showed no detectable HI antibodies for NDV and 54/88 virus.

The above serological findings together with the isolation of virus suggest that the viral agents involved in the disease outbreaks in pigeons were identical/closely related to NDV or were variant NDV (PMV-1 virus) which has been responsible for the recent panzootic in pigeons (D. J. Alexander, Personal Communication). The pathogenicity tests done as described⁶ indicate that the viral isolates were of a mesogenic strain.

13 June 1988; Revised 8 August 1988

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RECORDS OF GREEN LACEWINGS PREYING ON MEALYBUGS IN INDIA

A. KRISHNAMOORTHY and M. MANI

Division of Entomology and Nematology, Indian Institute of Horticultural Research, Bangalore 560 089, India.

Green lacewings (Chrysopidae, Neuroptera) are important predators of crop pests and are found in wide range of habitats. They are known to prey on, over 80 species of insects and ten of tetranychid mites¹. During a survey for collection of natural enemies of mealybugs (1984-87), eggs, larvae and pupae of green lacewings were collected from mealybugs infested orchards of citrus and guava and vineyards. These chrysopids were then reared to

adult hood for identification. A few parasitoids recovered from eggs and pupae collected from fields were also identified.

Mallada boninensis (Okamoto), *Chrysopa lacciperda* Kimmins, *Anisochrysa basalis* (Walker) and *Chrysoperla carnea* (Stephans) were found preying on citrus mealybug *Planococcus citri* (Risso) in citrus orchards. First three species are reported for the first time from India and also recorded for the first time feeding on *P. citri*. Although *Ch. carnea* is reported earlier from Western and Northern parts of India, feeding on *Heliothis*² and aphids^{3,4}, its occurrence on *P. citri* in citrus orchards from India is documented for the first time. Thus *Ch. carnea* appears to have migrated into Deccan Plateau. *Ch. carnea* was known to prey on *P. citri* in citrus orchards⁵ and vineyards⁶.

M. boninensis and *Apertochrysa* sp. are for the first time found preying on *Maconellicoccus hirsutus* (Green) in vineyards. Similarly the occurrence of *C. lacciperda* and *Ch. carnea* on striped mealybug, *Ferrisia virgata* (Ckll.) and *P. citri* in guava orchards is reported for the first time. *Chrysopa* sp. and *C. orestes* Banks were however reported preying on *F. virgata* from Madhya Pradesh⁷ and Orissa⁸ respectively.

These chrysopids were commonly found associated with mealybugs in large numbers during January to August (when mealybugs were also more) and played a major role with other local natural enemies in bringing down the mealybug populations in the orchards. Three parasitoids, viz., *Telenomus* sp. from eggs of *Ch. carnea*, *Tetrastichus* sp. and *Isodromus axillaris* Timberlake from pupae of *Ch. carnea* and *C. lacciperda* were collected. Former two parasitoids are of common occurrence while the latter is reported for the first time. The parasitism level due to these parasitoids during the entire period of survey was however less than 4% only. The parasitoids did not therefore, hinder the predator potential in controlling the mealybugs. Thus the predator can be best exploited for controlling the mealybugs in orchards and vineyards.

The authors are grateful to Drs. S. J. Brooks, B. R. Subba Rao, Z. Boucek and A. D. Austin, Commonwealth Institute of Entomology, London for determination of insects.

14 January 1988; Revised 23 May 1988

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