J.Biol.Control, 6 (2), 77-79, 1992

Occurrence of Baculovirus in Natural Population of *Oryctes rhinoceros* (L.) in Andhra Pradesh

A.SUJATHA, S.M.ZAHERUDDEEN and J.KRISHNA PRASADJI
Agricultural Research Station
A.P.Agricultural University
AMBAJIPETA 533 214

ABSTRACT

One hundred and sixty *Oryctes rhinoceros* (L.) beetles, collected from 30 villages of Godavari districts of Andhra Prasesh were screened for baculovirus disease. Examination of gross morphology of midgut and giemsa-stained smears of midgut aspirates and squash showed typical symptoms of baculovirus infection in 53.1% beetles. Similarly, *O. rhinoceros* grubs from 14.0% breeding sites in Gudapalli village and 20.0% breeding sites in Allavaram village showed the disease symptoms with 8.4% and 4.0% grub infection respectively. Present survey reveals the presence of *Oryctes* baculovirus in Andhra Pradesh.

KEY WORDS : Baculovirus, natural incidence, *Oryctes rhinoceros*, coconut

The rhinoceros beetle, *Oryctes rhinoceros* (L.) is a major pest of coconut palm with a wide distribution in Asia (Menon and Pandalai, 1958). The adult beetle bores through the unopened fronds and young spathes causing severe damage and consequently a setback in the growth of the palm and nut production is seen. Among the various methods of pest management, biological suppression using the baculovirus of *O.rhinoceros* is preferred for its long term effects and ecological acceptance. Baculovirus of *Oryctes* is claimed to be one of the most successful microbial control agents employed against an insect pest (Caltagirone, 1981). This disease was first reported by Huger in 1966 in Malaysia on *O. rhinoceros*. In India, the virus was first reported to occur in *O.rhinoceros* population of Kerala (Mohan *et al.*, 1983) and later from Tamil Nadu (Rajamanickam *et al.*, 1989). With a view to knowing the natural occurrence of the virus disease in *O.rhinoceros* populations of Andhra Pradesh, a detailed survey was initiated in 1989.

MATERIALS AND METHODS

One hundred and sixty *O.rhinoceros* beetles were collected from crowns of infested coconut palms and breeding sites from 29 villages in East Godavari district and one village of west Godavari district of Andhra Pradesh (Table 1). The beetles were dissected and examined for baculovirus disease using the following diagnostic methods (Mohan *et al.*, 1983); i. Visual examination of midgut and its contents and ii. examination of giemsastained smear of midgut contents.

Three hundred and ten grubs from 50 breeding sites of Gudapalli village and seventy five grubs from 15 breeding sites of Allavaram village of East Godavari district were observed for the presence of baculovirus (Table 2). Grubs from each breeding site were maintained in separate containers containing sterilized farm-yard manure. The grubs were periodically observed for external symptoms of baculovirus disease for a period of 30 days. The grubs which showed external symptoms of disease were dissected and stained smears of the midgut epithelium were examined for confirmation of virus disease.

RESULTS AND DISCUSSION

The midguts of diseased beetles were swollen, white in colour and contained a lot of mucoid white fluid while the midguts of healthy beetles were thin, brown in colour and contained very little brownish fluid.

Giemsa-stained smears of diseased midguts contained hypertrophied nuclei. These nuclei were distinct by the presence of a perinuclear ring which is uniformly stained in deep pink colour. The darkly stained granular network in the centre of nuclei suggested derangement of nuclei. In midgut smears of healthy beetles, the nuclei were small with purple chromatin network with uniformly distributed nucleoplasm. These observations are in conformity with the descriptions made by Mohan *et al.* (1983). Microscopic observation showed nucleus and cytoplasm in various stages i.e., slightly hypertrophied nuclei, granulated nucleoplasm, typical hypertrophied nuclei, with perinuclear ring indicating the disease intensity from initial to advanced stage. In general, the number of nuclei observed in diseased gut aspirates and squashes was more than that in healthy guts. Also gut aspirates presented a clear picture of nuclei than gut squashes. Mohan *et al.* (1983) reported similar observations.

Out of the 160 beetles screened for baculovirus, 53.1 per cent of the beetles was confirmed to be diseased both by visual symptoms and also by smear test (Table 1).

Virus - infected grubs were sluggish and stopped feeding. As a result, their cuticle became flaccid and turned waxy on the dorsal side. When the diseased grubs were cut open, the guts were found filled with white fluid but not food material. In contrast, the healthy grubs were active, robust and fed well. Their cuticle was turgid, glossy and from the dorsal side presence of food materials inside the body could be seen. These symptoms match with the description given by Huger (1966) and Mohan *et al.*(1985). The infected grubs did not reach pupation. Giemsa-stained smears of diseased midguts showed hypertrophied nuclei with sparse blue cytoplasm while healthy nuclei were small and well defined. Similar observations were reported by Mohan *et al.* (1985).

Out of the 50 breeding sites of Gudapalli village, grubs in seven breeding sites showed symptoms of baculovirus (Table 2). The disease intensity in the seven breeding sites ranged from 25-100%. Among the 15 breeding sites of Allavaram village, grubs in three breeding sites showed symptoms of baculovirus disease (Table 2).

Table 1. Natural incidence of baculovirus in *Oryctes rhinoceros* beetles in Godavari district of Andhra Pradesh

Village/Mandal	Beetles screeened	% incidence
Allavaram	1	100.0
Amalapuram	32	71.9
Ambajipeta	19	21.1
Gannavaram	9	22.2
Malkipuram	9	55.6
Mamidikuduru	11	18.2
Kadiyam	3	33.3
Razole	45	66.7
Sakhinetipalli	26	46.2
Tanuku	5	100.0
	160	53.1

Table 2. Natural incidence of baculovirus in *Oryctes rhinoceros* grubs in East Godavari district of Andhra Pradesh

Locality	No. of breeding sites observed	%. Infected breeding sites	No. of grubs collected	Disease %
Allavaram	15	20.0	75	4.0
Gudapalli	50	14.0	310	8.4

In the present studies, in addition to visual examination, smear test was employed which according to Mohan *et al.* (1983), besides immuno-osmophoresis (IOP), is ideal for screening large population of beetles. The observations of smear test in the present studies corroborated the visual diagnosis of disease.

ACKNOWLEDGEMENTS

The authors are thankful to Dr.G.B.Pillai, Principal Scientist and Head, Division of Entomology, Central Plantation Crops Research Institute, Regional Station, Kayangulam, Kerala for the guidance and imparting training in baculovirus studies. The financial help and facilities provided by I.C.A.R. and Andhra Pradesh Agricultural University are gratefully acknowledged.

REFERENCES

CALTAGIRONE, L.E. 1981. Landmark examples in classical biological control. *Ann. Rev. Entomol.*, **26**, 213-232.

HUGER, A.M. 1966. A virus disease of the Indian rhinoceros beetle, *Oryctes rhinoceros* (L.) caused by a new type of insect virus, *Rhabdionvirus oryctes*, gen.n.,sp.n. *J. Invertebr. Pathol.*, **8**, 38-51.

MENON, K.P.V. and PANDALAI, K.M. 1958. The coconut palm. A monograph. Indian Central Coconut Committee, Ernakulam, S.India. pp.384.

MOHAN,K.S., JAYAPAL,S.P. and PILLAI,G.B. 1983. Baculovirus disease in *Oryctes rhinoceros* population in Kerala. *J. Plant. Crops*, **11**, 154-161.

MOHAN,K.S., JAYAPAL,S.P. and PILLAI,G.B. 1985. Response of *Oryctes rhinoceros* larvae to infection by *Oryctes baculovirus*. *J. Plant. Crops*, **13**, 116-124.

RAJAMANICKAM,K., RAVEENDRAN,T.S. and KENNEDY,F.J.S. 1989. Natural occurrence of baculovirus disease in *Oryctes rhinoceros* (L.) population in Tamil Nadu. *J. Biol. Control*, **3**, 93-95.