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### DISTRIBUTION OF *HETERODERA AVENAE* THE CAUSAL ORGANISM OF 'MOLYA' DISEASE OF WHEAT AND BARLEY IN INDIA

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AMONGST the economically important plant parasitic nematode species reported from India, *Heterodera avenae*, is of considerable significance because of the economic losses to wheat crop in heavily infested areas. The nematode was reported associated with the 'molya' disease of wheat and barley in 1958<sup>1</sup> from the Sikar District of Rajasthan. At that time and for a long time since, it was known to be confined to the State of Rajasthan only. However, with the availability of more and more trained nematologists, surveys have been going on which have brought forth valuable information on its presence in areas hitherto unknown. Chhabra<sup>2</sup> and Singh *et. al.*<sup>3,4</sup> have recorded infested areas in Punjab and Jammu and Kashmir, respectively. We have been conducting surveys and reporting the occurrence of the nematode in different areas of Rajasthan and Haryana. However, a proper mapping has not been done so far. Recently new infestation sites, Ghaziabad (U.P.) and Najafgarh Block (Delhi), have come to our notice. A close look into the progressive recognition of the infested areas has thrown some light on the possible means of its spread to new areas.

Taking 1956 as the base year, when 'wheat-sickness' was first spotted in the Sikar District of Rajasthan, and 1958 as the year when association of *H. avenae* with 'wheat-sickness' was finally confirmed, the spread of the disease was both towards north as well south. On the basis of surveys conducted during 1958-62, the infestation sites recorded were: Churu, Jhunjhunu



Figure 1. Distribution of *H. avenae*. (O)

(north of Sikar) and Jaipur and Ajmer (south of Sikar). Additionally, Nim-ka-Thana was also found infested. Subsequent surveys revealed infestations in Narnaul (Haryana), Beawar, Udaipur and Chittorgarh (Rajasthan). The infestation sites in Punjab were reported only in the late 60's with Hoshiarpur and Ludhiana as the only two sites. Subsequently the presence of the nematode was found at many other sites of Punjab, Haryana and Rajasthan besides still limited sites in U.P. and Delhi (figure 1).

The pattern of spread indicates southern and north-eastern direction towards Uttar Pradesh. According to the present information, the western sector of Haryana is 'free' of *H. avenae* infestation. If we assume this as the correct situation, then initiation of infestation in Punjab may be independent of Rajasthan infestation. Indirectly, it is borne out also by the fact that Hoshiarpur and Ludhiana populations are different from the Rajasthan and Haryana populations<sup>5</sup>. The identification of the population types in Una (H.P.) and Jammu (J & K) may help in further precise assessment of the source of spread. Significantly all the infested areas, except Udaipur and Chittorgarh are in the sandy-loam or loamy-sand belt. Udaipur and Chittorgarh soils are comparatively heavier types but still friable and not the hard-pan type.

The movement of soil particles by wind appears to be the most obvious source of spread of the nematode to newer areas. This is particularly true of the climatic conditions in these areas. However, once established in an area, further spread appears to be due to water (irrigation, river, rivulets) transporting the cysts with water movement. One of the most recent examples of such a mode of spread was found in the Najafgarh Block (Delhi) which got flooded during August–September, 1978 from the water of Sahibi river (which cuts across the infested areas of Rajasthan and Haryana) overflowing the Dhansa bund. Further, spread of *H. avenae* to the wheat belt of U.P. through river Sahibi via Jamuna in the near future appears to be not ruled out.

29 June 1982

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### **CINTRACTIA LIMITATA CLINT ON CYPERUS PANGOREI ROTTB.**

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A SMUT disease of *Cyperus pangorei* was observed in Lucknow, during August–September 1981. Detailed investigations revealed it to be a species of *Cintractia*, *C. limitata* Clint. Scrutiny of available literature revealed that it is a new host record from India. From India only 13 species of *Cintractia* have been reported so far<sup>1</sup>. Type specimen has been deposited in Commonwealth Mycological Institute (IMI 261901), Kew, England. *Cintractia limitata* Clint. Proc. Bost. Soc. Natl. Hist., 31, 399, 1904.

Infection usually appears at the base of pedicels and peduncles forming conspicuous elongated columnar sori 6–8 × 2.5–3.5 mm, initially covered by a light pink covering, enclosing black agglutinated spore mass (figures 1–3). At maturity the sori split into 4–6 columns, the upper part of covering forming a frill like structure at the apex, exposing black powdery mass. Spores single, basipetally formed from a fertile stroma



**Figures 1–3.** *Cintractia limitata* on *Cyperus pangorei* 1. infected inflorescence ( $\times 0.5$ ), 2. sorus around peduncle ( $\times$  same size), 3. a part of infected inflorescence enlarged ( $\times 3.7$ ).

surrounding central columella of host, globose to subglobose  $10.2\text{--}18.7 \times 15.7\text{--}18.7 \mu\text{m}$ , brown to black with smooth exospore. Spores could not germinate by the method described by Nene and Bhelwa<sup>2</sup>. Spores of Indian strain of *C. limitata* are larger than North American strain<sup>3</sup>.

Authors are grateful to Dr. Anthony Johnston, Director, CMI, Kew for identifying the fungus, to Dr. B. N. Mehrotra, CDRI, Lucknow for identifying the