

Occurrence of *Gibbago trianthemae* Simmons on horse purslane, *Trianthema portulacastrum* L. in India

K. R. ANEJA and S. KAUSHAL

Department of Microbiology, Kurukshetra University
Kurukshetra 136 119, Haryana, India

ABSTRACT: During the surveys conducted in Haryana, a leaf spot disease creating epiphytotic was observed in 1990 on horse purslane at Kurukshetra. Infected leaves had dark-brown, round to irregular, necrotic lesions with maroon margins. The fungus was identified as *Gibbago trianthemae* Simmons, a phaeodictyoconidial hyphomycete. Its pathogenicity was confirmed, both *in vitro* and *in vivo*. This is the first report of occurrence of *G. trianthemae* on horse purslane in India.

KEY WORDS: Biocontrol, *Gibbago trianthemae*, leaf spot, *Trianthema portulacastrum*

Trianthema portulacastrum L. (Aizoaceae), commonly known as horse purslane, hogweed, itcit or santha is a pan-tropical weed of cultivated fields (Balyan and Bhan, 1986; Simmons, 1986). It is one of the troublesome weeds in Haryana, Punjab, Rajasthan, Uttar Pradesh and Delhi infesting important agricultural crops such as mustard, maize, sorghum, sugarcane, cotton, mungbean, potato and soybean (Balyan and Malik, 1989; Singh and Prasad, 1994). Fast growth and carpet forming habit of horse purslane prevents the growth of cereal crops reducing their yield and quality. *Gibbago trianthemae* Simmons has

been suggested as a useful agent for the biological control of horse purslane (Mitchell, 1988).

The objective of this study was to search for fungal pathogens capable of causing severe damage and ultimately reducing the plant population to economic levels. Surveys were initiated in 1989 in various districts of Haryana and Punjab states in search of pathogens with biocontrol potential on terrestrial weeds. A population of horse purslane in mustard fields at Kurukshetra near the Sthaneshwar Mahadev Mandir in February, 1990 was

found heavily affected by a leaf spot disease. Diseased leaves were collected in polythene bags and brought to the laboratory for study of symptoms, isolation and pathogenicity test of the organism (s) involved. Isolation of the pathogen from the diseased leaves followed the standard procedure as described earlier (Aneja and Singh, 1989) on potato dextrose agar containing yeast extract (0.5%) (PDAY) at $25\pm 1^\circ\text{C}$. Pathogenicity of the fungus was tested both on detached leaves (wounded and non-wounded) and plants grown in plastic pots, following the standard procedure.

In moist chambers, growth of a fungus with conidiophores and conidia was observed on infected portions, after 3-4 days incubation. This fungus isolate was obtained on PDAY medium at $25\pm 1^\circ\text{C}$ from infected horse purslane leaves. Colonies on PDAY grey coloured and surface spreading. Conidiophores macronematous, slightly swollen at the apex, proliferating sympodially. Conidia (poroconidia) yellow-brown, beakless, muriform, ellipsoid, smooth walled with 3-6 complete or partial transverse septa with constrictions and 1-6 complete or partial longitudinal septa, $30-68 \times 19-38\mu\text{m}$. Conidia germinating by 1-7 germ tubes produced from apical, lateral and /or basal cells, apical germ tubes giving rise directly to secondary conidiophores bearing secondary conidia identical with primary conidia. The fertile cell wall of the conidial initial remains intact, suggesting that the conidia of this fungus are holoblastic, based on Cole and Samson's (1979) classification

of development processes in conidial fungi. On the basis of symptomatology, cultural and morphological characteristics, it was identified as *Gibbago trianthemae* Simmons which was confirmed by the International Mycological Institute, UK (IMI Nos. 366406, 377851).

In pathogenicity tests, typical disease symptoms developed on both wounded and non-wounded leaves, both *in vitro* and *in vivo*, when inoculated with the pathogen, thus confirming the pathogenicity of *G. trianthemae* to horse purslane.

A literature search (Mitchell, 1988; Bilgrami *et al.*, 1991) indicated that this is the first report of the occurrence of *G. trianthemae* on horse purslane in India. It was first of all isolated and reported from parasitized leaves of *T. portulacastrum* collected in Cuba, USA (Texas) and Venezuela (Simmons, 1986). The degree of damage caused by the natural occurrence of the disease did not appear to be enough to significantly retard the fast growth rate of the host. Therefore, the possibility of utilizing *G. trianthemae* as a mycoherbicide by induction of artificial epidemics of damaging proportions is being investigated in this laboratory.

ACKNOWLEDGMENTS

The authors thank the Director, International Mycological Institute, UK for confirming the identity of the fungus and Dr. J. C. David of IMI for the useful comments on the fungus. Financial assistance from the UGC, New Delhi is also acknowledged.

REFERENCES

- Aneja, K. R. and Singh, K. 1989. *Alternaria alternata* (Fr.) Keissler, a pathogen of water hyacinth with biocontrol potential. *Tropical Pest Management*, **35** (4): 354-356.
- Balyan, R. S. and Bhan, V. M. 1986. Emergence, growth and reproduction of horse purslane (*Trianthema portulacastrum*) as influenced by environmental conditions. *Weed Science*, **34**: 516-519.
- Balyan, R. S. and Malik, R. K. 1989. Control of horse purslane (*Trianthema portulacastrum*) and barnyard grass (*Echinochloa crus-gali*) in mungbean (*Vigna radiata*). *Weed Science*, **37**: 695-699.
- Bilgrami, K. S., Jamaluddin. S. and Rizwi, M. A. 1991. Fungi of India - List and References. Today and Tomorrow's Printers and publishers, New Delhi, 798 pp.
- Cole, G. T. and Samson, R. A. 1979. Patterns of Development in Conidial Fungi. Pitman, London, 190pp.
- Mitchell, J. K. 1988. *Gibbago trianthemae*, a recently described hyphomycete with bioherbicide potential for control of horse purslane (*Trianthema portulacastrum*). *Plant Disease*, **72**: 354-355.
- Simmons, E. G. 1986. *Gibbago*, a new phaeodictyoconidial genus of hyphomycetes. *Mycotaxon*, **27**: 107-111.
- Singh, G. and Prasad, R. 1994. Studies on the control of *Trianthema portulacastrum* L. in fodder maize. *Indian Journal of Weed Science*, **26**(1&2): 64-67.