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Study for host range of *Gibbago trianthemae* Mycoherbicide

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Abstract
In Host range studies, of the 23 other crop and weed species belonging to seven families, the fungus was pathogenic to *T. portulacastrum* only, and was thus highly host specific.

Keywords: gibb ago trianthemae, trianthema portulacastrum, host range

Introduction
Protection of the crop from pests is imperative for enhanced agricultural production. The pests include diseases, insects and weeds. Of these, weeds alone cause on annual loss of about Rs. 1980 crores to Indian Agriculture (Gupta, 2000) [3].
The strategies for management options for terrestrial weeds include preventive measures like-physical control, soil solarization, cultural method like crop rotation, inter cropping, and use of chemical herbicides. Although several chemical herbicides have been developed for use in crops, there are certain draw backs of their use. Because of expenditure involved, their use is only feasible in cultivation or in small areas of pasture and not when the target weed covers very large area. Besides, these are effective for a short period only, thus require repeated use. From ecological point of view also, use of chemicals is problematic. If one species is destroyed, new ones which are not controlled by those particular herbicides emerge and become dominant in the existing ecosystem. The weeds also become resistant to herbicides with their repeated and prolonged use. Chemical herbicides are also reported to increase specific plant diseases (Hornby *et a*l., 1998; Johal and Huber, 2009) [5, 7], and several are reported to influence micronutrient availability (Huber *et al*., 2005; Evans *et al*., 2007) [4, 2]. Micronutrients are the activators or inhibitors of many critical physiological functions, and a deficiency or change in the availability of these regulatory elements can greatly affect plant growth and resistance to diseases and pests (Datnoff *et al*., 2007) [1].
Frequent use of chemical pose problem of pollution hazard that has been the subject of growing concern for both environment and public health authorities through the world. These chemical may also affect non -target organisms and can contaminate soil and ground water. The growing concern for environmental pollution due to chemical pesticides has led to research for alternative weed control strategies such as use of bio herbicides. The bio herbicides have been defined as insect pests or plant pathogens, phytotoxin derived from these pathogens or other microorganisms that can be argumentatively applied to control weeds (Hoagland, 1996) [6].

Material and Method
Host range
Host range of *Gibbago trianthemae* was studied by inoculating it on pot grown seedlings of different crop plant species. These belonged to different families, such as- *Gramineae* (Poaceae)- *Sorghum bicolor, Zea mays, Pennisetum typhoides, Oryza sativa, Triticum aestivum, Hordeum vulgare; Leguminoceae:- Vigna radiata, Vigna mungo, Cyamopsis tetragonoloba, Cajanas cajan, Glycine max, Arachis hypogaea, Trigonella foenum-graecum;* Solanaceae:- *Lycopersicon esculentum Capsicum annum, Solanum tuberasum, Solanum melongen and* weeds *-Trianthema portulacastrum, Chenopodium album* and *Amranthus viridis.* Seeds of local landraces of these were used. Surfaced sterilized seeds were sown in 20 cm face diameter earthen pots filled with autoclaved Garden-soil-FYM mixture (3:1). Three pots of each species, with ten plants per pot, were maintained as three replications 21- days-old plants were spray inoculated with spore suspension containing 1x 10^3 conidia ml^{-1}, prepared in sterilized distilled water from 10 –days- old culture grown on PDA.

For properly distributing the inoculum, Tween-20 @2 ml /L was added to the spore suspension. After inoculation, the plants were kept in humidity chamber for 48 hours, and then shifted to cage house bench good humidity was maintained by spraying water on the leaves as and when required. Observations for any disease development were recorded after 15 days of inoculation. To determine the host range, presence of disease was marked the + for host species and - for non-host species.

Result and Discussion

Host range studies

In host range studies, the fungus was pathogenic only to horse purslane *T. portulacastrum* and none of the 23 other crop and weed species belonging to 7 different plant families. Host range studies conducted on 24 plant species (4 weeds and 20 agricultural crops revealed that none of these other than *T. portulacastrum* was infected with *G. trianthemae*, and it was thus strictly host specific (Table-1).

Host Range studies of *Gibbago trianthemae*

Table 1: Response of various crops/weed species tested for susceptibility to *Gibbago trianthemae*

S. No.	Host	Family	Disease Reaction
1.	Sorghum (*Sorghum bicolor*)	Gramineae (Poaceae)	(-)
2.	Maize (*Zea mays*)	Gramineae (Poaceae)	(-)
3.	Pearl Millet (*Pennisetum typhoides)*	Gramineae (Poaceae)	(-)
4.	Rice (*Oryza sativa*)	Gramineae (Poaceae)	(-)
5.	Wheat (*Triticum aestivum*)	Gramineae (Poaceae)	(-)
6.	Barley (*Hordeum vulgare*)	Gramineae (Poaceae)	(-)
7.	Mung Bean (*Vigna radiata*)	Leguminoceae	(-)
8.	Urid Bean (*Vigna mungo*)	Leguminoceae	(-)
9.	Guar (*Cyamopsis tetragonoloba*)	Leguminoceae	(-)
10.	Arhar (*Cajanas cajan*)	Leguminoceae	(-)
11.	Soybean (*Glycin max*)	Leguminoceae	(-)
12.	Groundnut (*Arachis hypogaea*)	Leguminoceae	(-)
13.	Fenugreek (*Trigonella foenumgraecum*)	Leguminoceae	(-)
14.	Cauliflower (*Brassica oleracea* var. *botrytis*)	Cruiciferae	(-)
15.	Cabbage (*Brassica oleracea* var. *capitata*)	Cruiciferae	(-)
16.	Mustard (*Brassica campestris*)	Cruiciferae	(-)
17.	Tomato (*Lycopersicon esculentum*)	Solanaceae	(-)
18.	Chilli (*Capsicum annum*)	Solanaceae	(-)
19.	Potato (*Solanum tuberosum*)	Solanaceae	(-)
20.	Brinjal (*Solanum melongena*)	Solanaceae	(-)
21.	Carpetweed (*Trianthema portulacastrum*)	Aizoaceae	(+)
22.	Bathua (*Chenopodium album*)	Chenopodiaceae	(-)
23	Pigweed (*Amaranthus viridis*)	Amaranthaceae	(-)
24.	Spinach (*Beta vulgaris*)	Chenopodiceae	(-)

(+) Host species (-) Non Host Species

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