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RESEARCH NOTE

Host range studies of *Alternaria* spp., a causal agent of blight disease of linseed

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Alternaria blight is the most serious diseases of linseed caused by different *Alternaria* spp. The genus *Alternaria* Nees ex Fr. is widely distributed all over the world and is represented by number of species. The genus occupies a prime position and is significantly important as its members are well known in causing wide spread diseases of economic plants such as cereals, oilseed crops, spices, vegetables and ornamentals. The host range study of *Alternaria* spp., revealed that the pathogen was unable to infect any of the crop plants taken for study under the pot condition but showed mycelial growth on all the crops tested through detached leaf technique under laboratory condition. The maximum mycelial growth was observed on carrot grass (9.56 mm) followed by groundnut (8.82 mm), whereas, minimum mycelial growth was observed on sesame (2.52 mm). Therefore, based on this host range test, It was concluded that *Alternaria* spp., infecting linseed may also be pathogenic to other hosts only under controlled and favourable conditions.

Key words: Blight, Host range, Linseed

Linseed is an oldest oilseed crop, popularly called as poor man's crop of India. Linseed is also referred as 'flax' is an important *rabi* oilseed crop next to rapeseed and mustard in India. The crop is grown for seed as well as for the fibre purpose in South West Asia including Turkistan, Afghanistan and India, whereas, in Asia Minor and South Russia the crop is primarily grown for its oil. Linseed is adversely affected by different diseases, the most important pathogens of linseed are *Alternaria linicola* (blight), *Fusarium* spp. (wilt), *Botrytis cinerea* (gray mould), *Oidium lini* (powdery mildew) *Ascochyta linicola* (foot rot), *Melampsora lini* (rust), *Rhizoctona solani* (*Rhizoctonia* seedling blight), *Pythium megalacanthum* (scorch), *Septoria linicola* (pasmo), *Polyspora lini* (browning or stem break) and *Colletotrichum linicolum* (anthracnose) (Mercer *et al*., 1991).

Alternaria blight caused by *A. lini* (Dey) and *A. linicola* (Groves and Skolko) is known to inflict 40-60 per cent of yield losses in linseed (Singh *et al.,* 2003; Singh and Singh, 2004; Singh and Singh, 2005). The genus *Alternaria* occupies a prime position and is significantly important as it causes wide spread diseases in cereals, oilseeds, spices, vegetables and ornamentals. The pathogen may be host specific or may cause diseases on other crops. The host range studies of any pathogen will help in taking suitable management strategies during the off season and to avoid them during the cropping season. In view of it studies were under taken at Department of Pathology, UAS, Raichur during 2019-20 to assess the host range of *Alternaria* spp.

Under pot condition : To find out the host range of *Alternaria* spp., other than linseed, some of the cultivated oilseed crops such as castor, groundnut, safflower, sesame, sunflower, as well as carrot grass, a common weed were raised in earthen pots in poly house. The surface sterilized seeds of selected crops were sown in the pot mixture containing sand: soil: FYM (3:1:1) with three replications. In each pot two to three seedlings were retained and suitable un-inoculated control pots were also maintained and 30 days old seedlings were inoculated with pathogen culture (1×10^3 conidia/ml). Observations for disease symptoms were recorded at five days interval for up to 27 days of post inoculation and blight severity was measured by using 0-5 scale (Wheeler, 1969).

Detached leaf technique : The wet blotter paper was kept in the sterilized Petri plates and fresh sterilized young leaves (30 DAS) of different oilseed crops such as castor, groundnut, safflower, sesamum, sunflower and weed host carrot grass were placed on it and inoculated with *Alternaria* spp., spore disc. The plates were incubated at 25 ± 2°C for four days and observed for typical symptoms on the leaf.

The results revealed that the blight pathogen was unable to infect different host plants other than linseed. Out of six host plants inoculated, none of them were infected by *Alternaria* spp., and doesn't show any signs of infection to this pathogen (Table 1). The results are in confirmatory with Gupta (2008), where in the results revealed that, the host range of *A. lini* and *A. linicola* on 72 different crop plants and weeds belongs to different families such as Solanaceae, Chenopodiaceae, Euphorbiaceae, Fabaceae, Rubiaceae, Convolvulaceae, Linaceae, Poaceae, Papaveraceae, Canabinaceae, Asteraceae, Rosaceae, Primulaceae, Umbellifereae, Brassicaceae, Amaranthaceae, Acanthaceae, Nyctaginaceae, Malvaceae, Lamiaceae, Verbenaceae, Rutaceae, Apocynaceae, Caesalpinaceae, Asclepiadaceae, Cucurbitaceae and Aizoaceae. Among the 72 host tested, *A. lini* was able to infect groundnut and was highly pathogenic as it infected a wide variety of hosts belonging to different families including the member of Linaceae, *Linum grandiflorum*. The observations also revealed that *A. linicola* was unable to infect Indian diversified species of various families except *L. grandiflorum* belonging to Linaceae.

Mangala *et al*. (2006) made an investigation regarding pathogenicity of *A. alternata* on chilli cultivars and other host plants. The fungus isolated from diseased chilli leaves produced typical leaf blight symptoms upon inoculation to healthy chilli plants that were similar to those recorded on naturally infected plants. Upon artificial inoculation, small necrotic spots were appeared on other hosts such as tomato, redgram, blackgram, greengram, groundnut, cabbage and mustard, while blight symptoms were observed on

Table 1. The reaction of the different host plants to *Alternaria* spp., under pot culture and in detached leaf technique

Host plant	Botanical Name leaves	Growth of *Alternaria* spp., under detached leaf technique (mm)
Carrot grass	*Parthenium hystero phorus*	9.56*
Castor	*Ricinus communis*	3.79
Groundnut	*Arachis hypogaea*	8.82
Safflower	*Carthemus tinctorius*	3.27
Sesame	*Sesamum indicum*	2.52
Sunflower	*Helianthus annus*	3.02
	S.Em.±	1.02
	C.D. at 1 %	3.07

No symptoms were observed on growth of *Alternaria* spp., under pot conditions.
*Mean of four replications

aubergine, tobacco, soybean, clusterbean, potato and cauliflower. The leaf spot symptoms were also observed on the weeds such as *Solanum nigrum, Physalis minima, Datura metel, Amaranthus viridis* and *Digera arvensis*, while no symptoms were observed on *Parthenium hysterophorus*.

Virulence of *A. solani* and *A. alternata* on tomato and potato crops were analyzed by Stammler *et al*. (2014). The pathogens were isolated from potato at different regions worldwide and the same isolates were inoculated on tomato in the greenhouse and potato in the greenhouse and in the field conditions. However, in all trials *A. solani* isolates were highly virulent while *A. alternata* isolates showed low or no symptoms after inoculation.

The present investigation was conducted in laboratory under controlled condition (temperature at 25 °C and relative humidity 95 %) to know the sporulation of *Alternaria* spp., on other hosts through detached leaves of test plants. Laboratory conditions were kept optimal for the infection of *Alternaria* spp., under pot condition. The results showed that, the mycelial growth of the pathogen was significantly maximum on carrot grass (9.56 mm) followed by groundnut (8.82 mm), and found on par with each other and statistically superior over other hosts (Table 1). While, the mycelial growth on castor, safflower, sesame and sunflower were on par with each other and differ statistically with carrot grass and groundnut. Significantly least mycelial growth was observed on sesame (2.52 mm).

Therefore, based on the host range studies, it was concluded that *Alternaria* spp., infecting linseed may also be pathogenic to other hosts only under controlled and favourable conditions.

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