INTRODUCTION

Physic nut (Jatropha curcas L.) globally known as jatropha belonging to the family Euphorbiaceae is a large shrub or small tropical tree widely distributed in arid and semiarid areas. It is a multipurpose, stress resistant, zero-waste perennial and monoecious plant which is considered as a potential source of non-edible fuel-producing plant. (Ram et al., 2012)

Moreover, parts of the shrub are used in traditional medicine and as raw material for pharmaceutical and cosmetic industries (Paramathma et al., 2006). Anthracnose is one of the important diseases observed on Jatropha curcas incited by Colletotrichum gloeosporioides causing damages on leaves, stems and fruits and consequently a decrease in seed quantity and quality (Chavhan, 2007; Pinto et al., 2011). Colletotrichum is an important pathogen in different crops. (Pasuvaraji et al., 2013). The symptoms observed are small lesions on leaves which later lead to complete necrosis or blighting of leaves. Lesions can also be seen on the fruits leading to mummification of the fruits with pinkish discoloration and the seeds developed from such fruits are much smaller and shriveled compared to seeds from healthy fruits (Plate 1 and 2). Kwon et al. (2012) first reported anthracnose disease on Jatropha curcas caused by Colletotrichum gloeosporioides in Korea. Santos et al. (2013) isolated and characterized C. gloeosporioides and C. capsici from physic nut seeds causing anthracnose from Brazil. No doubt in the past few decades chemical pesticides have protected the plants from diseases, their continuous and overuse have led to some serious ecological problems, viz. hazardous effects on beneficial organisms in soil, residual effects, pollution and resistant strain development in pathogen. Hence it is much better and safer to use the naturally available bioagents and the plant extracts with antifungal activity. The paper deals with management of C. gloeosporioides by using different plant extracts and its role on sporulation of C. gloeosporioides

MATERIALS AND METHODS

Pathogen was isolated on potato dextrose agar (PDA) by tissue isolation method and pure culture was obtained by following single spore isolation(Choi et al.,1999).The pathogen was identified as Colletotrichum gloeosporioides based on morphological characters. It produced single celled conidia in acervuli (Plate 3). Pathogenicity was proved by employing Koch’s postulates.

The antifungal activity of eight plant extracts belonging to different families and one commercial product Multineem containing Azadirachtin on the mycelial growth and sporulation of C. gloeosporioides was studied in vitro by poisoned food technique (Nene and Thapliyal, 1982) at two concentrations, i.e. 5 and 10 per cent (Table 1). Fresh healthy leaves or bulbs were washed thoroughly with clean tap water and subsequently with sterile distilled water. Hundred gram of either leaves or bulbs were crushed in a pestle and mortar...
Table 1: Effect of plant extracts on per cent inhibition of mycelial growth and sporulation of Colletotrichum gloeosporioides

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Per cent inhibition (%)</th>
<th>Mean</th>
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<tbody>
<tr>
<td></td>
<td>Concentration</td>
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<tr>
<td></td>
<td>5 % Sporulation</td>
<td>10 % Sporulation</td>
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<tr>
<td>Glyricidia</td>
<td>13.33 (21.39)</td>
<td>32.77 (34.90)</td>
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<tr>
<td>Neem</td>
<td>24.52 (29.49)</td>
<td>34.62 (35.98)</td>
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<tr>
<td>Onion</td>
<td>36.29 (37.01)</td>
<td>39.81 (39.10)</td>
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<tr>
<td>Eucalyptus</td>
<td>27.07 (31.32)</td>
<td>38.70 (38.31)</td>
</tr>
<tr>
<td>Duranta</td>
<td>23.16 (28.74)</td>
<td>41.07 (39.83)</td>
</tr>
<tr>
<td>Ocimum</td>
<td>30.18 (33.30)</td>
<td>20.55 (26.93)</td>
</tr>
<tr>
<td>Azadirachtin (2.5 &amp; 5.0%)</td>
<td>88.51 (70.16)</td>
<td>89.99 (71.53)</td>
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<tr>
<td>Garlic</td>
<td>23.69 (28.87)</td>
<td>18.88 (25.62)</td>
</tr>
<tr>
<td>Ginger</td>
<td>39.99 (39.20)</td>
<td>56.10 (48.48)</td>
</tr>
<tr>
<td>Mean</td>
<td>30.75 (32.52)</td>
<td>36.64 (37.35)</td>
</tr>
</tbody>
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Plant extract (P) Concentrations (C) PXC
S.E.m ± 0.99 0.44 1.40
CD at 1% 2.43 1.08 3.42

*Figures in the parentheses indicate arc sine transformed values; +++: Heavy sporulation >50 conidia per microscopic field; ++: Moderate sporulation 10-50 conidia per microscopic field; +: Scanty sporulation < 10 conidia per microscopic field; -: No sporulation

RESULTS AND DISCUSSION

The data presented in Table 1 reveals that among the plant extracts evaluated, azadirachtin showed maximum inhibition of mycelial growth (89.99%) at 5 percent and 2.5 per cent concentrations (88.51%) followed by ginger, 56.10 per cent (10%) and 39.99 per cent (5%). Next best was onion bulb extract at 10 per cent (39.81%) and 5 per cent (36.29%). Rest of the botanicals gave comparatively least growth inhibition (Plate 4a). Azadirachtin and garlic bulb extract completely inhibited the sporulation of C. gloeosporioides. These results are in agreement with those of earlier workers, viz. Shekhavat and Prasad (1971) and Mesta (1996). Garlic bulb extract inhibited mycelial growth of C. gloeosporioides to an extent of 60 per cent (Mukherjee et al., 2011) and complete mycelium...
inhibition in *C. dematium* (Bhuiyan et al., 2008). Ethanol extracts of *Allium cepa*, *Allium sativum*, *Azadirachta indica* and *Ocimum sanctum* showed fungitoxic properties against *C. capsici* (Ashashivapuri et al., 1997). Jadav et al. (2008) reported that garlic bulb (10%) extract was effective in inhibiting the growth of *C. gloeosporioides*. Watve et al. (2009) reported that maximum inhibition was achieved due to neem leaf extract (78.15%) followed by garlic (58.89%) and tulsi (55.93%) and the least colony diameter was observed in glyricidia (25.93%) against jatropha leaf spot caused by *Colletotrichum gloeosporioides*. Ojha et al. (2008) recorded 94 per cent mycelial inhibition of *C. gloeosporioides* infecting *Saraca asoca* with garlic bulb extract.

Though neem, eucalyptus and ocimum extracts reduced the mycelial growth, they resulted in increased sporulation when compared to control (Plate 4b). This warrants us that such
plant extracts that encourage sporulation should not be used in plant disease management because they increase the disease incidence and severity through increased production of spores which subsequently spread to new areas and crops. The present investigation revealed that azadirachtin was effective in inhibiting mycelial growth as well as sporulation and garlic bulb extract was effective in reducing sporulation of C. gloeosporioides infecting Jatropha curcas.

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REFERENCES


