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RESEARCH ARTICLE

Management of tikka disease of groundnut by using different botanicals and bioagents

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ABSTRACT

Experiments were carried out for studying the efficiency of leaf extracts of differents botanicals and culture filterates of bioagents for control of tikka diasease of groundnut. The use of leaf extracts of differents botanicals and boigagents was found to be effective. The kernel extract (5 % conc.) of *Azadirachta indica* was found to be superior for control of tikka disease (PDI 16.98%) amongst the treatments followed by *Eucalyptus* sp. (PDI 21.02 %) and *Truchoderma viride* (culture filtrate 5 %) (PDI 22.93 %). The PDI of control was found to be maximum as 37.63 Per cent. Also an increased pod yield (1.4 kg per plot) was found with leaf kernel extract of *Azadirachta indica.*

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INTRODUCTION

Among all oilseed crops, groundnut (*Arachis hypogeae* L.) is one of the principal oilseed crops of world. The groundnut is affected by various diseases like early leaf spot, late leaf spot, rust, crown rot or seeding blight, stem rot and collar rot. Among the important fungal diseases, leaf spot caused by *Phaeosiariopsis personata* (Blerk. and Curt.), van Arx (late leaf spot) and *Cercospora arachidicola* Hori (early leaf spot) are the most serious diseases causing premature defoliation. The yield losses due to disease ranged from 10 per cent to 50 per cent (Ghuge *et al*., 1981).

Several fungi, bacteria and botanicals were reported to have broad spectrum antifungal activity and promosing disease control in several crops under green house and field conditions. With increase in awareness among consumers about toxic hazards of chemicals to crop, consumers and environmental due to phytotoxici residual toxicity and pollutaion, the importance of botanical products in plant disease control has been emphasized. Considering the importance of groundnut crop and losses caused by leaf spots present study was undertaken with an objective to find out efficiency of plant extract of different indigenous medicinal plants and bioagents against Tikka disease of groundnut.

MATERIALS AND METHODS

***Preparation of sample* :**

The present research was conducted in Maharashtra , Department of Plant Pathology, College of Agriculture, Nagpur. The seeds used for conducting research were procured from local agricultural farm. Bioagents *viz., Trichoderma viride, T.harzianum, Pseudomonas* sp. *Verticillium lecanii* and botanical *viz., Azadirachta indica, Eucalyptus* sp. and *Datura metel* were procured from the Department of plant Pathology.

Mass multiplication of bioagents :

For mass multiplication, Potato dextrose broth and Nutrient broth were prepared in 250 ml flasks, each containing 150 ml broth. The flask were inoculated with *Trichoderma viride, T. harziamum, Pseudomonas* sp. and *Verticilium lecanii* separately and incubated for 7 days at 28 $\pm$ 2^0C.

Field experiment :

For the present investigation, field trial was laid out in Randomnised Block Design with eight treatments and three replications at experiment farm, College of Agriculture, Nagpur during *Rabi* season 2006. The variety used was JL-24.

Treatment details :

T_1 : *Azadirachta indica*(Leaf kernel extract 5% conc.)
T_2 : *Eucalyptus* sp. (Leaf extract 5% conc.)
T_3 : *Datura metal* (Leaf extract 5% conc.)
T_4 : *Trichoderma harzium* (Culture filterate 5% conc.)
T_5 : *Trichoderma viride*(Culture filterate 5% conc.)
T_6 : *Pseudomonas sp.*(Culture filterate 5% conc.)
T_7 : *Verticilium lecanii* (Culture filterate 5% conc.)
T_8 : Control

Pathgencity test :

Pathgencity test of *Cercospora* spp. was carried out on healthy detached groundnut leaves. Fresh groundnut leaves infected with Tikka disease were collected from the green house as well as from the field. Superficial fungal groth was scraped with blade and incorporated water. The spore suspension (4×10^5 spore/ml) thus, prepared was utilized for the experiment.

Detached leaf inoculation :

Healthy groundnut leaves were surface sterilized with 70 per cent absolute alcohol and given 3 to 4 washings with distilled water. Leaves were injured by pin-prick method. Spore suspension was sprayed with an atomizer on leaves. Five leaves inoculated were kept ; two each in separate moist chamber maintained in Pertriplates. Distilled sterilized water was used in moist chamber for maintaining required humidity. The Pertriplates were incubated at 25 $\pm 2^0$C for 10 days. The observations regarding per cent disease intensity were recorded, when lesions developed after 15 days of inoculation. Plants sprayed with sterilized distilled water, served as control.

Preparation of cultures filtrates :

For preparation of culture filtrates of bioagents, 15 days old growth was mixed thoroughly and filtered thoroughly and filtered through muslin cloth and then through double layered whatman No. 40 filter paper (for fungal bioagents) and bacterial bioagents were filtered through bacterial filter. The extract for each species was prepared, separated and stored in plugged flask solutions. Different concentrations were prepared by adding sterile distilled water.

Preparations of aqueous leaf extracts :

The particulars plant part such as leaves were freshly collected and cleaned with tap water to remove the dust particles associated with it. Sufficient quantity of selected plant parts (10g in all cases) were cut into small pieces. The mentioned extracts were prepared by crushing the materials after washing with distilled sterilized water and then thoroughly macerating in morter and pestle. One ml of sterilized water was used, filtered through there folds of muslim cloth to remove fibrous and suspended material. Concentrations were prepared by adding sterilized distilled water.

Effects of culture filtrates, aqueous leaf extract and fungicides against Tikka disease of groundnut in field condition

First spraying of bioagents, botanicals and fungicides were given 30 days after emergence of seeding, when the initial symptoms of the disease appeared to plant followed by second, thrice and fourth spraying after 15 days interval. Disease intensity of Cerspora leaf spot was recorded 30 DAS, 45 DAS, 90 DAS by selecting 5 plants randomly. Observations on 6 leaves *i.e.* 2 each from bottom, middle and top of each plant were recorded. Plants were graded in 1-9 scale (Mayee and Datar, 1986).

Per cent disease intensity (PDI) was worked out using the following formula :

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{Total plants observed x Maximum ratings}} \text{x100}$$

The PDI values were transformed by square root transformation and angular transformation and analyzed statistically. The per cent disease control was calculated using formula :

$$PDI = \frac{\text{Disease intensity (\%) in control - Disease intensity [\%] in treatement}}{\text{Disease intensity (\%) in control}} \text{x100}$$

RESULTS AND DISCUSSION

The experimental findings of the present study have been presented in the following sub heads:

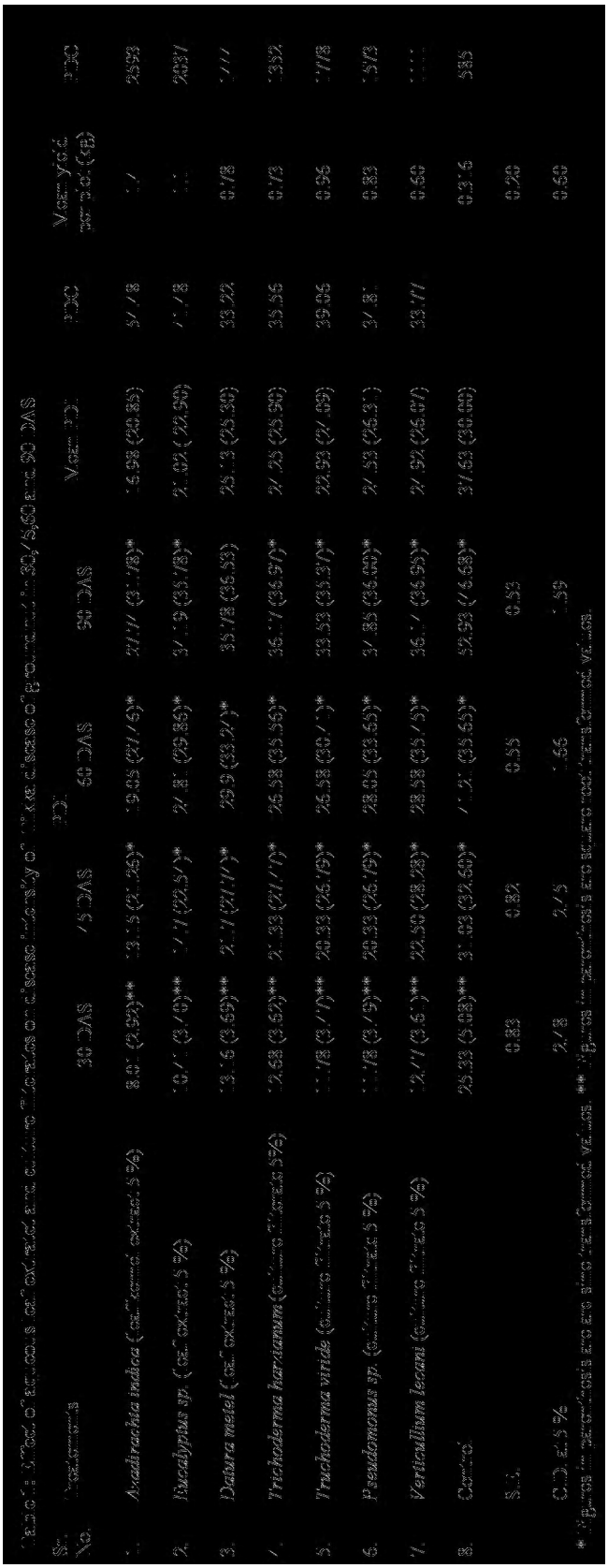
Pathogencity test :

Pathogencity of the test fungus Cercospora spp. was tested on healthy detached groundnut leaves by "Detached leaf technique" (Gobina and Melouk, 1983). All the inoculated leaves showed infection and conidial formation.

Effect of aqueous leaf extracts and culture filterates on disease intensity and pod yield of groundnut :

The pathogencity was proved by "Detached leaf technique". The healthy detached leaves of groundnut were inoculated with spore suspension of pathogen.The fungus produced symptoms similar to those reported earlier by Gobina and Melouk (1983).

In the present work, all treatments showed significantly less disease intensity of Tikka disease of groundnut compared



to control at 30, 45, 60 and 90 DAS (Table 1). Leaf kernel extract *Azadirachta indica* 5 per cent was found to be superior (PDI 16.98%) amongs all the treatments, followed by *Educalyptus* sp. 5.0 conc. (PDI 21.02%) and *Truchoderma viride* (culture filtrate 5 %) (PDI 22.93 %). These results were in agreement with Ghewande (1989) who stated that *Azadirachta indica* and *Lawsonia inermis* were effective in controlling leaf spot and rust disease of groundnut *in vivo*. Similar results are obtained by Usman *et al.*(1991), Kishore *et al.* (2002), Adiver (2004) and Kishore and Pande (2005).

Culture filtrates of bioagents 5 per cent were used and results revealed that, all culture filtrates of bioagents significantly reduced per cent disease intensity of Tikka disease over control (Table 1). Cultural filtrate of *Trichoderma viride* showed significantly less per cent disease intensity (PDI 22.93%) compared to remaining culture filtrates of bioagents followed by *Trichoderma harzianum* (PDI 24.25%), *Pseudomonas* sp. (PDI 24.53%) and *Verticilium lecanii* (PDI 24.92%). These results are in agreement with the observations of Mathivanam *et al.* (2000) and Meena *et al.*(2000) and (2002).

Pod yield of groundnut increased singificantly by the plant extract over control.The highest increased in pod yield was by *Azadirachta indica* leaf extract sprays (1.41 kg per plot) followed by sp. (leaf extract 5 %). Similar increase in pod yield was obtained by Ghewande (1989), using *Azdirachta indica* and *Lawsonica inermis* leaf extracts sprays against late leaf spot and rust of groundnut. Among the four bioagents used for the study, *Trichoderma viride* (culture filtrate 5 %) reported maximum pod yield (0.96 kg per plot).

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